



**PERMIT APPLICATION REVIEW FORM FOR
CABLE, CONDUIT, AND POLE LINE ACTIVITY
IN FORT BEND COUNTY**

**Fort Bend County
Engineering Department**
301 Jackson Suite 401
Richmond, Texas 77469
281.633.7500
Permits@fortbendcountytexas.gov

☐

Right of Way Permit

☒

Commercial Driveway Permit

Permit No: 2017-16891

The following "Notice of Proposed Cable, Conduit, and/or Pole Line activity in Fort Bend County" and accompanying attachments have been reviewed and the notice conforms to appropriate regulations set by Commissioner's Court of Fort Bend County, Texas.

(1) COMPLETE APPLICATION FORM:

X
X
X

- a. Name of road, street, and/or drainage ditch affected.
- b. Vicinity map showing course of directions
- c. Plans and specifications

(2) BOND:

☐

County Attorney, approval when applicable.

☐

Perpetual bond currently posted.

Bond No: _____ Amount: _____

☒

Performance bond submitted.

Bond No: [REDACTED] Amount: \$5,000.00

☐

Cashier's Check

Check No: _____ Amount: _____

(3) DRAINAGE DISTRICT APPROVAL (WHEN APPLICABLE):

Drainage District Approval

Date

We have reviewed this project and agree it meets minimum requirements.

Charles O. Ay

Permit Administrator

2/2/2018

Date



REVIEW BY FORT BEND COUNTY
COMMISSIONERS COURT

**Fort Bend County
Engineering Department**
301 Jackson Suite 401
Richmond, Texas 77469
281.633.7500
Permits@fortbendcountytexas.gov

X

Permit No: 2017-16891

Applicant: Dmac Construction & Development, Inc.

Job Location Site: 21821 S Post Oak Boulevard, Arcola, TX 77545

Bond No. [REDACTED] **Date of Bond:** 11/10/2017 **Amount:** \$5,000.00

The above applicant came to make use of certain Fort Bend County property subject to, "The Order Regulating the Laying, Construction, Maintenance, and Repair of Buried Cables, Conduits, and Pole Lines, In, Under, Across or Along Roads, Streets, Highways, and Drainage Ditches in Fort Bend County, Texas, Under the Jurisdiction of the Commissioners Court of Fort Bend County, Texas," as passed by the Commissioners Court of Fort Bend County, Texas, of the Minutes of the Commissioners Court of Fort Bend County, Texas, to the extent that such order is not inconsistent with Chapter 181, Vernon's Texas Statutes and Codes Annotated.

Notes:

1. Evidence of review by the Commissioners Court must be kept on the job site and failure to do so constitutes grounds for job shutdown.
2. Written notices are required:
 - a. 48 hours in advance of construction start up, and
 - b. When construction is completed and ready for final inspection, submit notification to Permit Administrator thru [MyGovernmentOnline.org](https://mygovernmentonline.org) portal.
3. This permit expires one (1) year from date of permit if construction has not commenced.

On this 13th day of February, 2018, Upon Motion of Commissioner _____, seconded by Commissioner _____, duly put and carried, it is ORDERED, ADJUDGED AND DECREED that said notice of said above purpose is hereby acknowledged by the Commissioners Court of Fort Bend County, Texas, and that said notice be placed on record according to the regulation order thereof.

Signature

Presented to Commissioners Court and approved.

By:

Charles O. Ay

Date Recorded _____ Comm. Court No. _____

for

N/A

Clerk of Commissioners Court

By:

Drainage District Engineer/Manager

By:

Deputy

PERFORMANCE BOND COVERING ALL CABLE, CONDUIT AND/OR POLE LINE
ACTIVITY IN, UNDER, ACROSS OR ALONG FORT BEND COUNTY ROAD,
COMMERCIAL DRIVEWAY AND MEDIAN OPENINGS OR MODIFICATIONS
(AUTHORIZED)

BOND NO [REDACTED]

THE STATE OF TEXAS §

KNOW ALL MEN BY THESE PRESENTS:

COUNTY OF FORT BEND §

THAT WE, DMAC Construction & Development, Inc. whose is 1819 First Oaks Street, Suite 100, Richmond, Texas 77406, (832) 328-3339, hereinafter called the Principal, and The Guarantee Company of North America USA, a Corporation existing under and by virtue of the laws of the state of Michigan and authorized to do an indemnifying business in the state of Texas, and whose principal office is located at One Towne Square, Suite 1470, Southfield, MI 48076 - 3725, whose officer residing in the State of Texas, authorized to accept service in all suits and actions brought within said state is Richard Sauer and whose address is 350 Glenborough Dr., Suite 138, Houston, TX 77067, hereinafter called the Surety, and held and firmly bound unto, Robert E. Hebert, County Judge of Fort Bend County, Texas, or his successors in office, in the full sum of Five Thousand and no/100 Dollars (\$ 5,000.00) current, lawful money of the United States of America, to be paid to said Robert E. Hebert, County Judge of Fort Bend County, Texas, or his successors in office, to which payment well and truly to be made and done, we, the undersigned, bind ourselves and each of us, our heirs, executors, administrators, successors, assigns, and legal representatives, jointly and severally, by these presents.

THE CONDITION OF THIS BOND IS SUCH THAT, WHEREAS, the above bounden principal contemplates laying, constructing, maintaining and/or repairing one or more cables, conduits, and/or pole lines in, under, across and/or along roads, streets and highways, commercial driveway and median openings or modifications in the County of Fort Bend, and the State of Texas, under the jurisdiction of the Commissioners' Court of Fort Bend County, Texas, pursuant to the Commissioners' Court order adopted on the 1st day of December, A.D. 1980, recorded in Volume 13, of the Commissioners' Court Minutes of Fort Bend County, Texas, regulating same, which Commissioners' Court order is hereby referred to and made a part hereof for all purposes as though fully set out herein;

AND WHEREAS, the principal desires to provide Fort Bend County with a performance bond covering all such cable, conduit and/or pole line activity, commercial driveway and median openings or modifications;

NOW, THEREFORE, if the above bounden principal shall faithfully perform all its cable, conduit and/or pole line activity (including, but not limited to the laying, construction, maintenance and/or repair of cables, conduits and/or pole lines) in, under, across and/or along roads, streets and highways, commercial driveway and median openings or modifications in the County of Fort Bend and State of Texas, under the jurisdiction of the Commissioners Court of Fort Bend County, Texas, pursuant to and in accordance with minimum requirements and conditions of the above mentioned Commissioners' Court order set forth and specified to be by said principal done and performed, at the time and in the manner therein specified, and shall pay over and make good and reimburse Fort Bend County, all loss and damages which Fort Bend County may sustain by reason of any failure or default on the part of said principal, then this obligation shall be null and void, otherwise to remain in full force and effect.

This bond is payable at the County Courthouse in the County of Fort Bend and State of Texas.

It is understood that at any time Fort Bend County deems itself insecure under this bond, it may require further and/or additional bonds of the principal.

EXECUTED this 10th day of November , 2017 .

DMAC Construction & Development, Inc.
PRINCIPAL


BY

The Guarantee Company of North America USA
SURETY


BY - Kristi Lovett, Attorney in Fact



The Guarantee Company of North America USA
Southfield, Michigan

POWER OF ATTORNEY

KNOW ALL BY THESE PRESENTS: That **THE GUARANTEE COMPANY OF NORTH AMERICA USA**, a corporation organized and existing under the laws of the State of Michigan, having its principal office in Southfield, Michigan, does hereby constitute and appoint

David G. Milette, Edward G. Britt, Jr., David T. Milette, Kristi Lovett, Barry K. McCord, Robert C. Davis, Ashley Britt, Joni Bowen Maness,
Rita G. Gulizo, Susan D. Zapalowski, Tabitha Starkey, Jennie Goonie, Nikole Jeannette
Bowen, Milette & Britt Insurance Agency, LLC

its true and lawful attorney(s)-in-fact to execute, seal and deliver for and on its behalf as surety, any and all bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof, which are or may be allowed, required or permitted by law, statute, rule, regulation, contract or otherwise.

The execution of such instrument(s) in pursuance of these presents, shall be as binding upon **THE GUARANTEE COMPANY OF NORTH AMERICA USA** as fully and amply, to all intents and purposes, as if the same had been duly executed and acknowledged by its regularly elected officers at the principal office.

The Power of Attorney is executed and may be certified so, and may be revoked, pursuant to and by authority of Article IX, Section 9.03 of the By-Laws adopted by the Board of Directors of **THE GUARANTEE COMPANY OF NORTH AMERICA USA** at a meeting held on the 31st day of December, 2003. The President, or any Vice President, acting with any Secretary or Assistant Secretary, shall have power and authority:

1. To appoint Attorney(s)-in-fact, and to authorize them to execute on behalf of the Company, and attach the Seal of the Company thereto, bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof; and
2. To revoke, at any time, any such Attorney-in-fact and revoke the authority given, except as provided below
3. In connection with obligations in favor of the Florida Department of Transportation only, it is agreed that the power and authority hereby given to the Attorney-in-Fact includes any and all consents for the release of retained percentages and/or final estimates on engineering and construction contracts required by the State of Florida Department of Transportation. It is fully understood that consenting to the State of Florida Department of Transportation making payment of the final estimate to the Contractor and/or its assignee, shall not relieve this surety company of any of its obligations under its bond.
4. In connection with obligations in favor of the Kentucky Department of Highways only, it is agreed that the power and authority hereby given to the Attorney-in-Fact cannot be modified or revoked unless prior written personal notice of such intent has been given to the Commissioner – Department of Highways of the Commonwealth of Kentucky at least thirty (30) days prior to the modification or revocation.

Further, this Power of Attorney is signed and sealed by facsimile pursuant to resolution of the Board of Directors of the Company adopted at a meeting duly called and held on the 6th day of December 2011, of which the following is a true excerpt:

RESOLVED that the signature of any authorized officer and the seal of the Company may be affixed by facsimile to any Power of Attorney or certification thereof authorizing the execution and delivery of any bond, undertaking, contracts of indemnity and other writings obligatory in the nature thereof, and such signature and seal when so used shall have the same force and effect as though manually affixed.



IN WITNESS WHEREOF, **THE GUARANTEE COMPANY OF NORTH AMERICA USA** has caused this instrument to be signed and its corporate seal to be affixed by its authorized officer, this 2nd day of October, 2015.

THE GUARANTEE COMPANY OF NORTH AMERICA USA

STATE OF MICHIGAN
County of Oakland

Stephen C. Ruschak, President & Chief Operating Officer

Randall Musselman, Secretary

On this 2nd day of October, 2015 before me came the individuals who executed the preceding instrument, to me personally known, and being by me duly sworn, said that each is the herein described and authorized officer of The Guarantee Company of North America USA; that the seal affixed to said instrument is the Corporate Seal of said Company; that the Corporate Seal and each signature were duly affixed by order of the Board of Directors of



Cynthia A. Takai
Notary Public, State of Michigan
County of Oakland
My Commission Expires February 27, 2018
Acting in Oakland County

IN WITNESS WHEREOF, I have hereunto set my hand at The Guarantee Company of North America USA offices the day and year above written.

I, Randall Musselman, Secretary of **THE GUARANTEE COMPANY OF NORTH AMERICA USA**, do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney executed by **THE GUARANTEE COMPANY OF NORTH AMERICA USA**, which is still in full force and effect.



IN WITNESS WHEREOF, I have thereunto set my hand and attached the seal of said Company this 10th day of November, 2017

Randall Musselman, Secretary



TEXAS CONSUMER NOTICE

1. IMPORTANT NOTICE

To obtain information or make a complaint:

2. You may contact your **agent** at:

3. You may call The Guarantee Company of North America USA's toll-free telephone number for information or to make a complaint at: 1-866-328-0567

4. You may also write to The Guarantee Company of North America USA at:

One Towne Square, Suite 1470
Southfield, Michigan 48076
Web: www.theguaranteeus.com
E-mail: Info@theguaranteeus.com
Fax: 248-750-0431

5. You may contact the Texas Department of Insurance to obtain information on companies, coverages, rights or complaints at: 1-800-252-3439

6. You may write the Texas Department of Insurance:
333 Guadalupe Street
P.O. Box 149104
Austin, TX 78701
Fax: (512) 490-1007
Web: <http://www.tdi.texas.gov>
E-mail: ConsumerProtection@tdi.texas.gov

7. PREMIUM OR CLAIM DISPUTES:

Should you have a dispute concerning your premium or about a claim you should contact the (agent) (company) (agent or the company) first. If the dispute is not resolved, you may contact the Texas Department of Insurance.

8. ATTACH THIS NOTICE TO YOUR POLICY:

This notice is for information only and does not become a part or condition of the attached document.

AVISO IMPORTANTE

Para obtener informacion o para someter una queja:

Puede comunicarse con su **agent** al

Usted puede llamar al numero de telefono gratis de The Guarantee Company of North America USA's para informacion o para someter una queja al: 1-866-328-0567

Usted tambien puede escribir a to The Guarantee Company of North America USA;

One Towne Square, Suite 1470
Southfield, Michigan 48076
Web: www.theguaranteeus.com
E-mail: Info@theguaranteeus.com
Fax: 248-750-0431

Puede comunicarse con el Departamento de Seguros de Texas para obtener informacion acerca de companies, coberturas, derechos o quejas al: 1-800-252-3439

Puede escribir al Departamento de Seguros de Texas:
333 Guadalupe Street
P.O. Box 149104
Austin, TX 78701
Fax: (512) 490-1007
Web: <http://www.tdi.texas.gov>
E-mail: ConsumerProtection@tdi.texas.gov

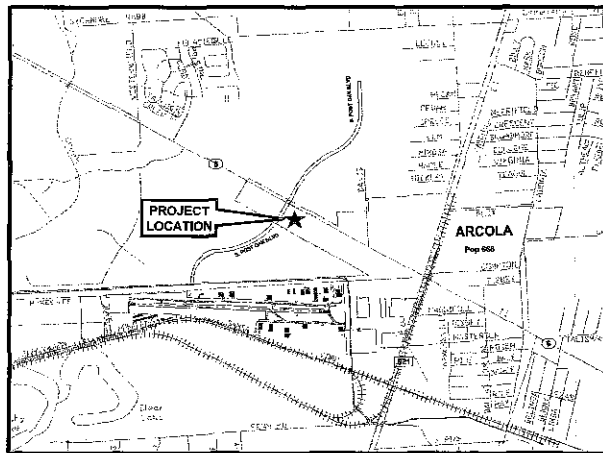
DISPUTAS SOBRE PRIMAS O RECLAMOS:

Si tiene una disputa concerniente a su prima o a un reclamo, debe comunicarse con el (agente) (la compania) agente o la compania) primero. Si no se resuelve la disputa, puede entonces comunicarse con el departamento (TDI).

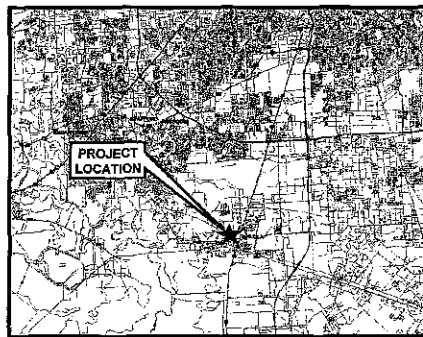
UNA ESTE AVISO A SU POLIZA: Este aviso es solo para proposito de informacion y no se convierte en parte o condicion del document adj unto.

CITY OF ARCOLA, TEXAS HOUSTON SOUTHWEST AIRPORT SITE DEVELOPMENT PROJECT

JUNE 2017



LOCATION MAP
SCALE: 1" = 1,500'



VICINITY MAP
SCALE: 1" = 20,000'



HOUSTON SOUTHWEST AIRPORT
503 McKEEVER RD.
ARCOLA, TEXAS 77583

AIRPORT MANAGER
LEN FRANKLIN

CITY OF ARCOLA - MAYOR
MARY ETTA ANDERSON

CITY COUNCIL MEMBERS
FLORENCE A. JACKSON
EVELYN JONES
GREG ABARR
ROSIE ROJAS
GLENN SANCO



816 Park Two Dr., Sugar Land, Texas 77478
T. 281-494-3252 F. 281-494-3234
www.ksaeng.com

RECOMMENDED BY:

KSA
TBPE FIRM REGISTRATION No. F-1356



Philip W. Huseman, P.E.
Digitally signed by Philip W. Huseman, P.E.
Date: 2017.06.29 08:41:24 -0500

PHILIP W. HUSEMAN, P.E. DATE
PROJECT MANAGER

31. 28 287

FORT BEND COUNTY ENGINEER

ENGINEER: *Richard W. Stolleis, P.E.*
for Richard W. Stolleis, P.E.

DATE: 7/28/17

THESE SIGNATURES ARE VOID IF CONSTRUCTION HAS NOT COMMENCED IN (1) YEAR FROM DATE OF APPROVAL.

APPROVED: *[Signature]*

DATE: 7/28/17



816 Park View Dr., Sugar Land, Texas 77478
7, 281-494-5122 F. 281-494-1234

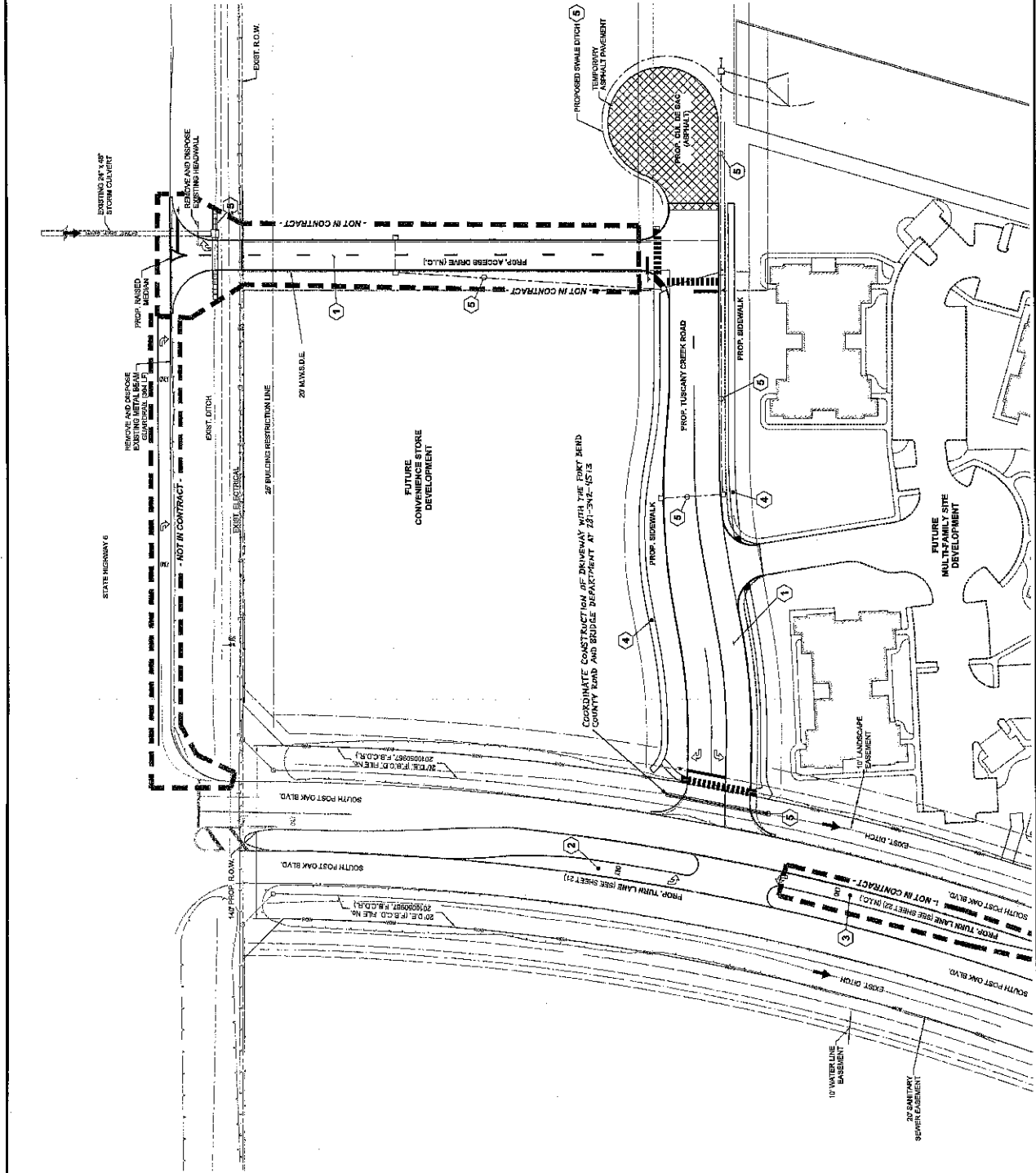
816 Park View Dr., Sugar Land, Texas 77478
7, 281-494-5122 F. 281-494-1234

CITY OF ARCOLA
SITE DEVELOPMENT PROJECT
ARCOLA, TEXAS

PROJECT LAYOUT

PROJECT ITEMS

- 1 ACCESS ROADS
- 2 TURN LANE 1
- 3 TURN LANE 2
- 4 SIDEWALK
- 5 DRAINAGE IMPROVEMENTS



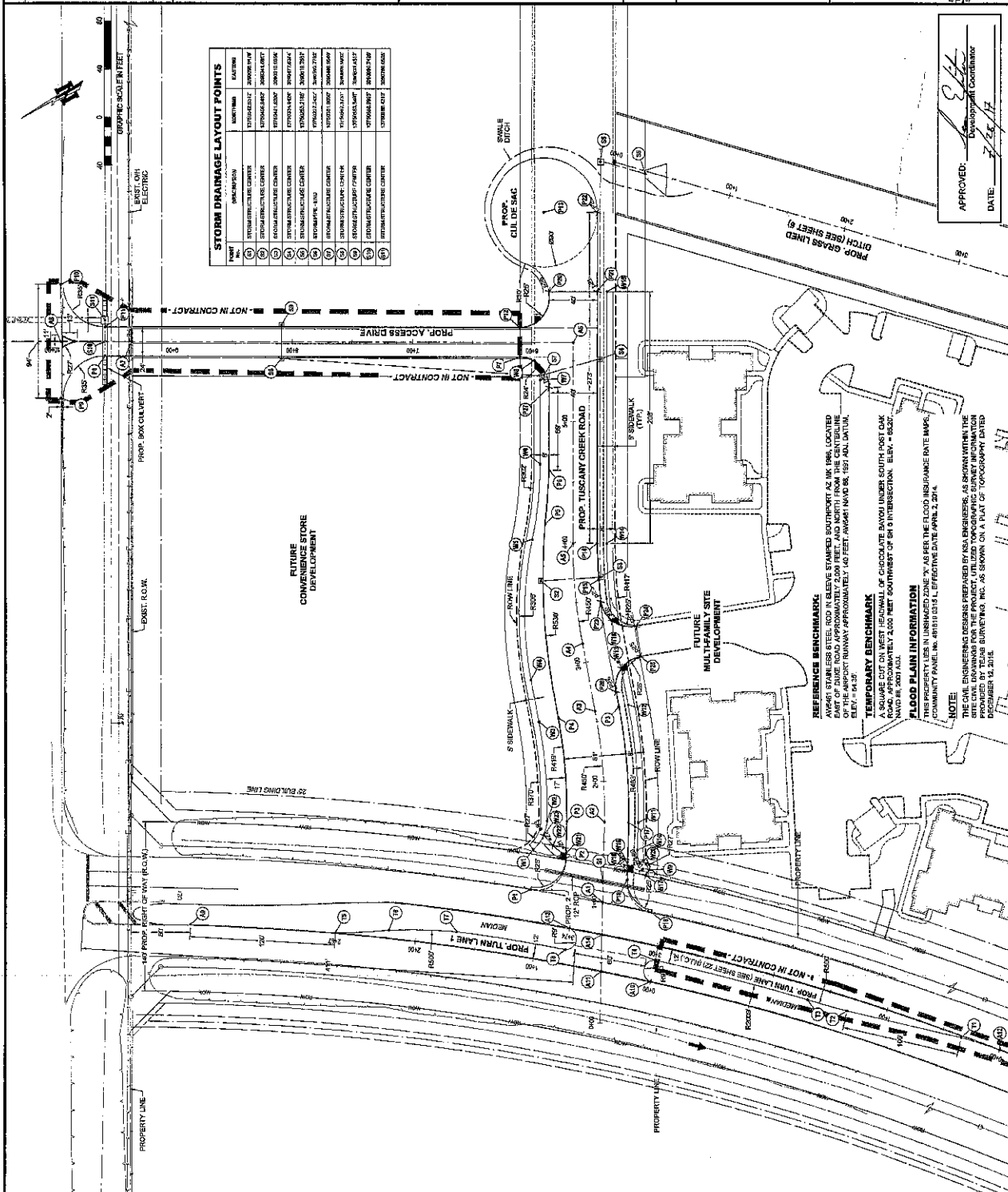
**VSA**

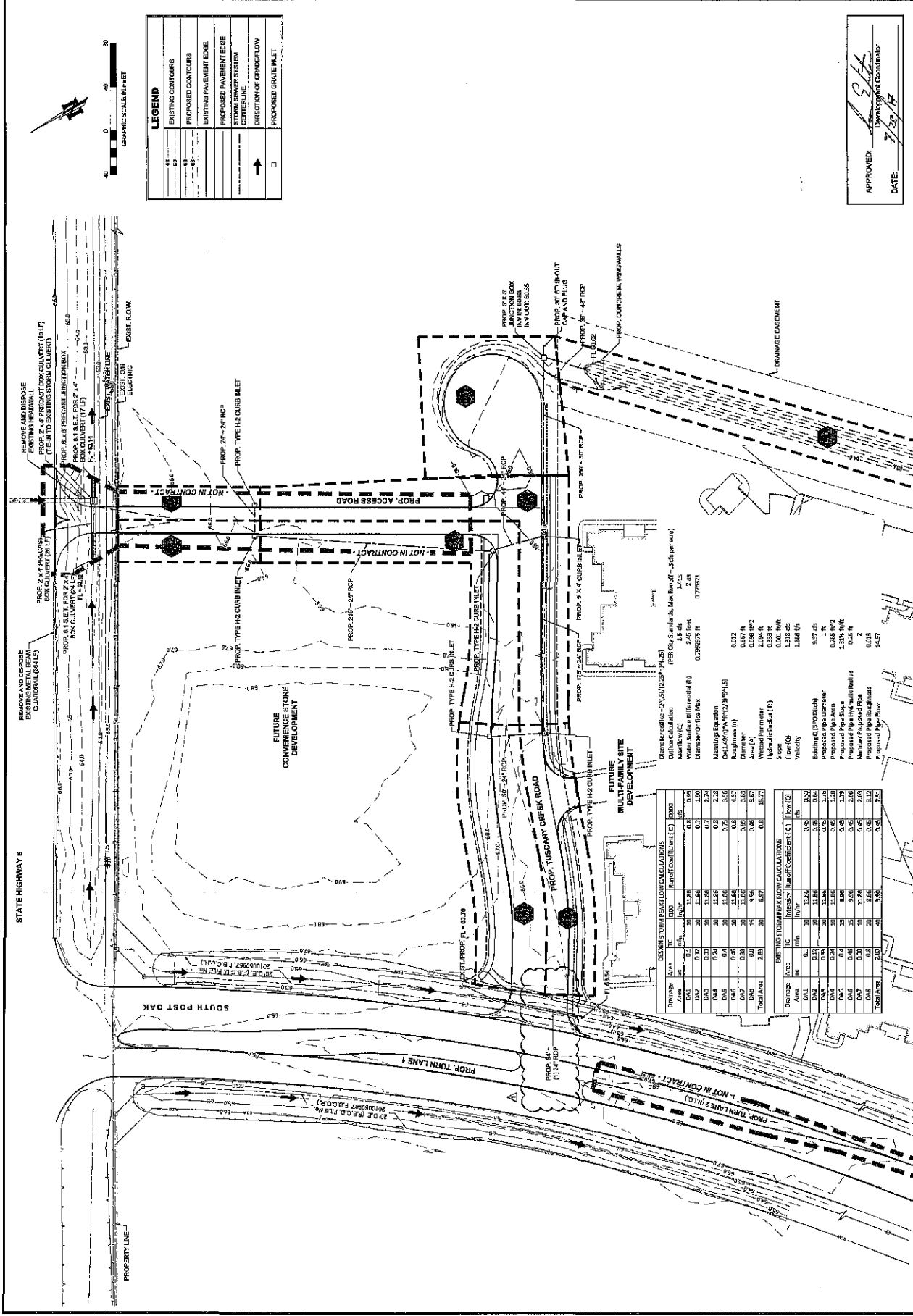
CITY OF ARCOLA
SITE DEVELOPMENT PROJECT
ARCOLA, TEXAS

DIMENSIONAL CONTROL

[illegible]

STORM DRAINAGE LAYOUT POINTS			
POINT NUMBER	DESCRIPTION	MARKETING	LOCATION
01	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER
02	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER
03	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER
04	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER
05	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER
06	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER
07	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER
08	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER
09	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER
10	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER	STORM DRAINAGE CENTER

[illegible]



Drainage calculation
 Max flow (CFS) 1.403
 Max flow (MGD) 0.003
 Diameter (inches) 12
 Diameter (feet) 1.0

Manhole location
 Manhole (inches) 18
 Diameter (feet) 1.5
 Area (sq ft) 17.67
 Wetted perimeter (ft) 28.26
 Slope (ft/ft) 0.01
 Velocity (ft/s) 1.48
 Flow (CFS) 1.403

Basin (CFS) 1.403
 Proposed pipe diameter (inches) 18
 Proposed pipe area (sq ft) 2.26
 Proposed pipe slope (ft/ft) 0.01
 Proposed pipe velocity (ft/s) 1.48
 Proposed pipe flow (CFS) 1.403

Basin (CFS) 1.403
 Proposed pipe diameter (inches) 18
 Proposed pipe area (sq ft) 2.26
 Proposed pipe slope (ft/ft) 0.01
 Proposed pipe velocity (ft/s) 1.48
 Proposed pipe flow (CFS) 1.403

Drainage Area (ac)	TC	Intensity (in/hr)	Runoff Coefficient (C)	Q (CFS)
DA1	0.1	1.18	0.7	0.9
DA2	0.2	1.18	0.7	1.8
DA3	0.3	1.18	0.7	2.7
DA4	0.4	1.18	0.7	3.6
DA5	0.5	1.18	0.7	4.5
DA6	0.6	1.18	0.7	5.4
DA7	0.7	1.18	0.7	6.3
DA8	0.8	1.18	0.7	7.2
DA9	0.9	1.18	0.7	8.1
DA10	1.0	1.18	0.7	9.0
Total Area	5.0	1.18	0.7	45.0

Drainage Area (ac)	TC	Intensity (in/hr)	Runoff Coefficient (C)	Q (CFS)
DA1	0.1	1.18	0.7	0.9
DA2	0.2	1.18	0.7	1.8
DA3	0.3	1.18	0.7	2.7
DA4	0.4	1.18	0.7	3.6
DA5	0.5	1.18	0.7	4.5
DA6	0.6	1.18	0.7	5.4
DA7	0.7	1.18	0.7	6.3
DA8	0.8	1.18	0.7	7.2
DA9	0.9	1.18	0.7	8.1
DA10	1.0	1.18	0.7	9.0
Total Area	5.0	1.18	0.7	45.0

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DA1	0.1	1.18	0.7	0.9
DA2	0.2	1.18	0.7	1.8
DA3	0.3	1.18	0.7	2.7
DA4	0.4	1.18	0.7	3.6
DA5	0.5	1.18	0.7	4.5
DA6	0.6	1.18	0.7	5.4
DA7	0.7	1.18	0.7	6.3
DA8	0.8	1.18	0.7	7.2
DA9	0.9	1.18	0.7	8.1
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DA2	0.2	1.18	0.7	1.8
DA3	0.3	1.18	0.7	2.7
DA4	0.4	1.18	0.7	3.6
DA5	0.5	1.18	0.7	4.5
DA6	0.6	1.18	0.7	5.4
DA7	0.7	1.18	0.7	6.3
DA8	0.8	1.18	0.7	7.2
DA9	0.9	1.18	0.7	8.1
DA10	1.0	1.18	0.7	9.0
Total Area	5.0	1.18	0.7	45.0

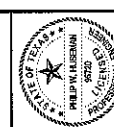
DATE	REVISION

GRASS LINED DRAINAGE CHANNEL

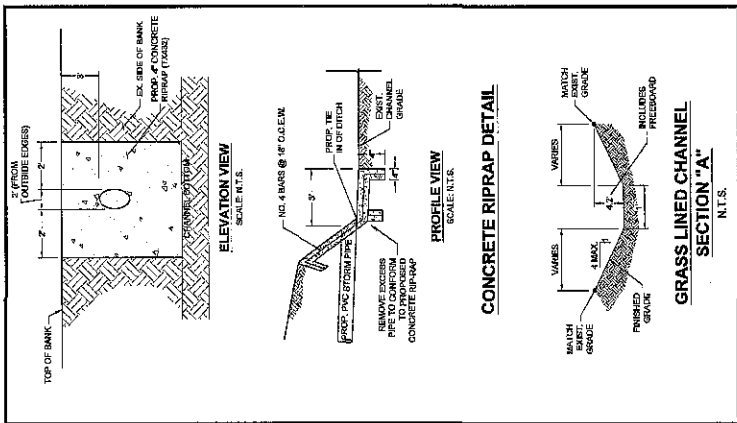
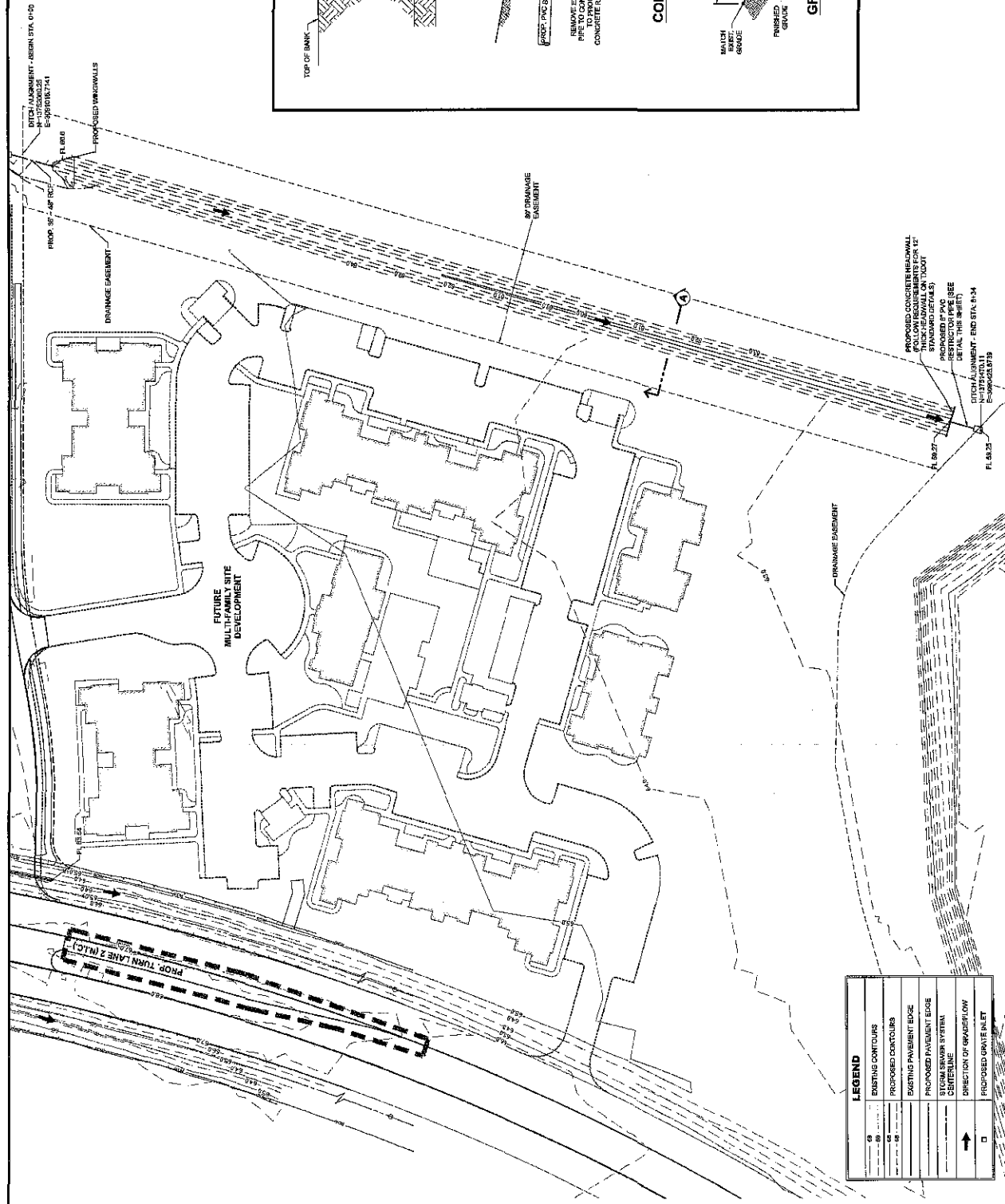
CITY OF ARCOLA
SITE DEVELOPMENT PROJECT
ARCOLA, TEXAS

PROJECT NUMBER	10000017
DATE	02/25/2017
DESIGNED BY	CLD
CHECKED BY	CLD
IN CHARGE	CLD

KSA
KSA ENGINEERING, INC.
1106 PINE TRAIL BLVD., SUITE 100, ARCOLA, TEXAS 77001
TEL: 409.484.1234 FAX: 409.484.1235
WWW.KSAENGINEERING.COM



PHILIP A. HESTON
PROFESSIONAL ENGINEER
MECHANICAL
STATE OF TEXAS
LICENSE NO. 10000017
EXPIRATION DATE 02/25/2020

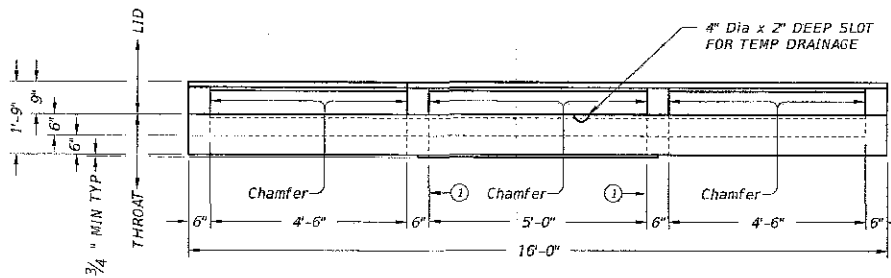


LEGEND	
EXISTING CONTOURS	---
PROPOSED CONTOURS	---
EXISTING PAVEMENT EDGE	---
PROPOSED PAVEMENT EDGE	---
EXISTING DRAINAGE SYSTEM	---
PROPOSED DRAINAGE SYSTEM	---
DIRECTION OF FLOW	→
PROPOSED GRAVE INLET	□

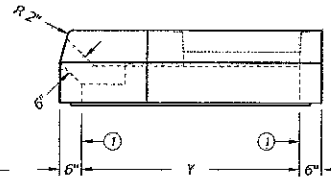
APPROVED: *[Signature]*
DATE: 2/25/17
DRAWN BY: *[Signature]*
CHECKED BY: *[Signature]*
IN CHARGE: *[Signature]*

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by the Texas Department of Transportation for the use of this standard in any project or for any conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



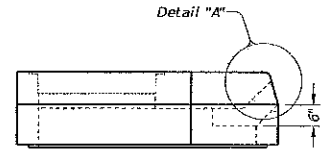
FRONT VIEW
(SHOWING LEFT AND RIGHT EXTENSIONS)



RIGHT VIEW

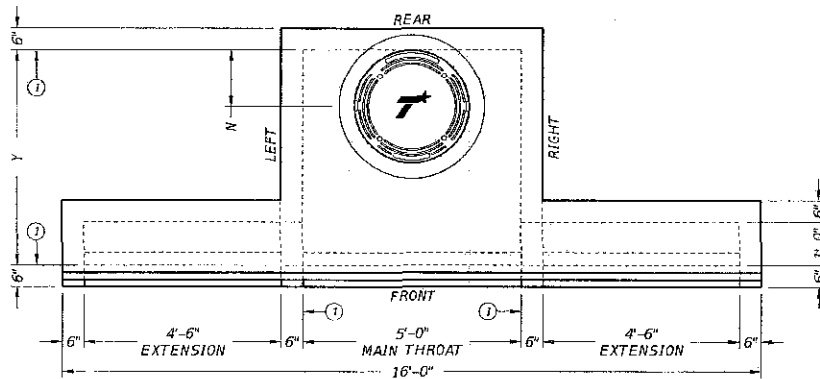


REAR VIEW
(EXTENSIONS NOT SHOWN)

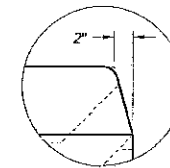


LEFT VIEW

① Matches inside face of wall of precast base or riser below inlet.



PLAN VIEW
(SHOWING LEFT AND RIGHT EXTENSIONS)



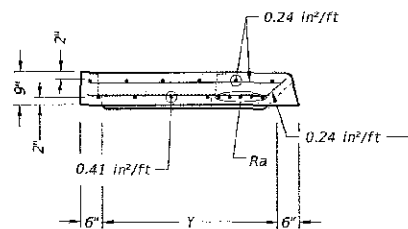
DETAIL "A"

SHEET NO.
7

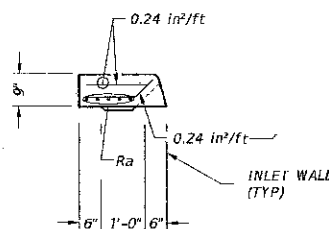
APPROVED: *[Signature]*
Development Coordinator
DATE: 7/20/17

HS20 LOADING		SHEET 1 OF 2	
Texas Department of Transportation		Bridge Division Standard	
PRECAST CURB INLET OUTSIDE ROADWAY			
PCO			
FILE: precast03.dgn	DATE: January 2015	REV: TxDOT	REV: TxDOT
COMP: TxDOT	SECT: RAYBURN	JOB: HIGHWAY	SECTION: STREET A&B
BY: [Blank]	CHECK: [Blank]	DATE: [Blank]	DATE: [Blank]

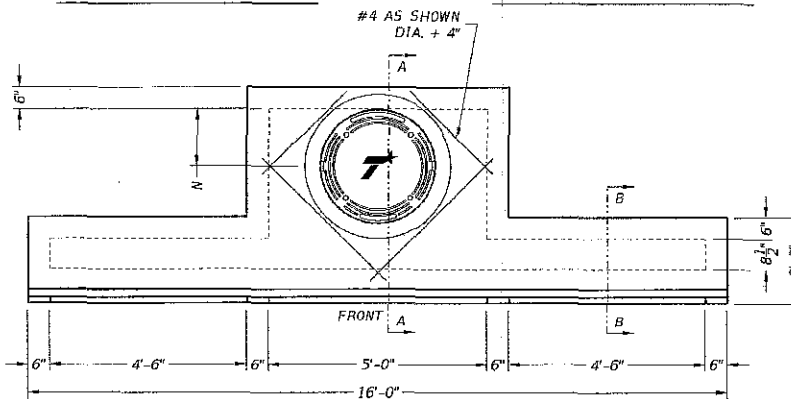
DISCLAIMER: The use of this standard is governed by the Texas Engineering Practice Act. No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion and its standard to other codes or for incorrect results or damages resulting from its use.



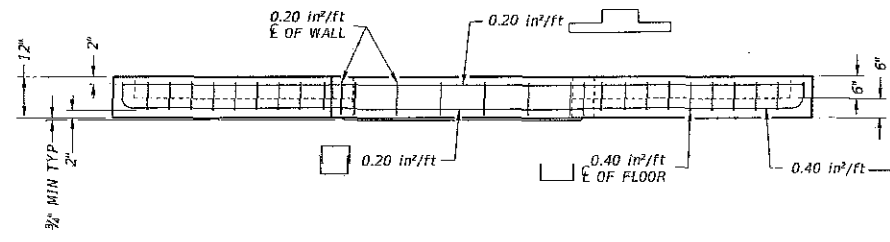
LID SECTION A-A



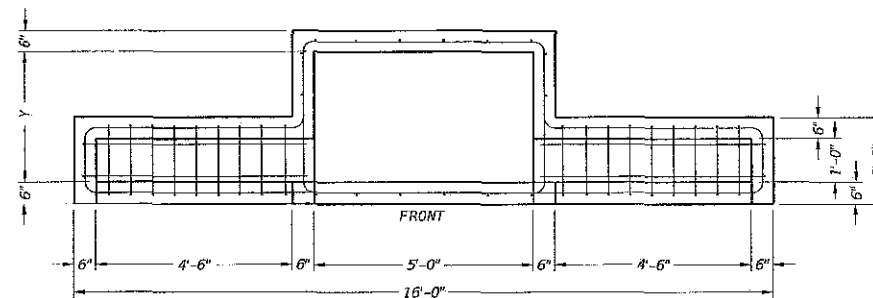
LID SECTION B-B



LID PLAN VIEW
(SHOWING LEFT AND RIGHT EXTENSIONS)



THROAT ELEVATION VIEW
(SHOWING LEFT AND RIGHT EXTENSIONS)



THROAT PLAN VIEW
(SHOWING LEFT AND RIGHT EXTENSIONS)

SIZE (Y)	N	MH DIA*	Ra
3'	9"	18"	(4) #5 Additional
4'	16"	32"	(4) #5 Additional
5'	16"	32"	(4) #5 Additional
6'	16"	32"	(4) #5 Additional

* Nominal ring and cover size.

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Extensions may be right, left, both or none. Provide extensions as specified elsewhere in the plans.
4. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is 3/4".
5. Lid may employ a butt joint with dowels at the Contractor's option.
6. Provide lifting devices in conformance with Manufacturer's recommendations.
7. Provide cast iron solid cover, unless noted otherwise elsewhere in the plans.
8. Chamfer vertical edges of Inlet lid 3/4" as shown in Front View, sheet 1.

INSTALLATION NOTES:

1. Inlet throat and lid are not intended for direct traffic. Do not place in roadway.
2. Seal tongue and groove joints and butt joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or 1/2 the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.

GENERAL NOTES:

1. Designed according to ASTM C913.
2. Open area of main throat = 360 sq in. Open area of one extension throat = 324 sq in.
3. Payment for inlet is per Item 465, "Junction Boxes, Manholes, and Inlets" by type, size, and extension placement. Extensions are subsidiary to inlet.

Cover dimensions are clear dimensions, unless noted otherwise.

SHEET NO.
8

APPROVED: *[Signature]*
Development Coordinator
DATE: 7/28/17

HS20 LOADING SHEET 2 OF 2

Texas Department of Transportation
Bridge Division
Standard

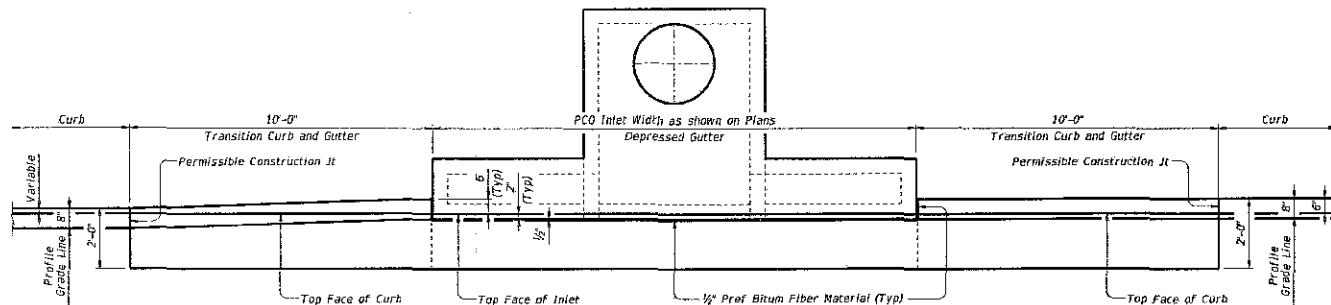
PRECAST CURB INLET
OUTSIDE ROADWAY

PCO

FILE	PROJECT	DATE	BY	CHK	APP	REV	DATE
PCO	PCO	PCO	PCO	PCO	PCO	PCO	PCO

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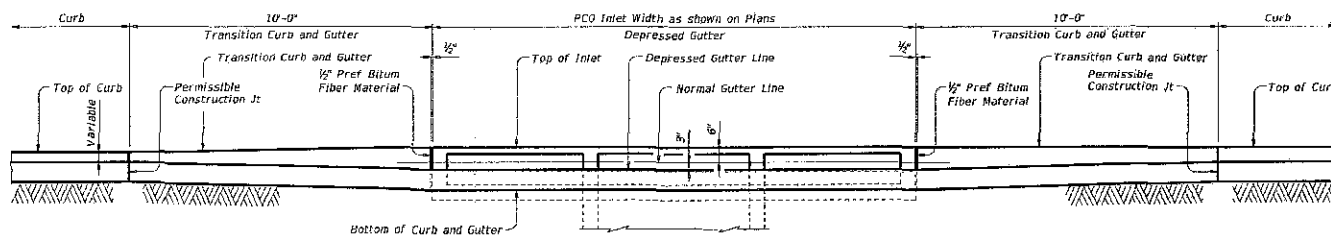
DATE:
FILE:



SHOWING TYPE I, IIa & III Curb and Gutter

SHOWING TYPE II & IV Curb and Gutter

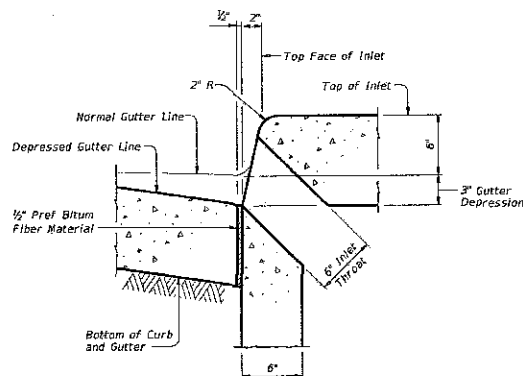
PLAN



SHOWING TYPE I, IIa & III Curb and Gutter

SHOWING TYPE II & IV Curb and Gutter

ELEVATION



SECTION AT GUTTER AND INLET

Reinforcing steel not shown for clarity.

- CONSTRUCTION NOTES:**
Align top face of curb with PCO Inlet as shown.
- MATERIAL NOTES:**
Provide 1/2" Preformed Bituminous Fiber Material.
- GENERAL NOTES:**
See Precast Curb Inlet Outside Roadway (PCO) standard for details and notes not shown.
See Concrete Curb and Gutter (CCCC-12) standard for details and notes not shown.
Curb and Gutter Transitions is paid for and in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
Preformed Bituminous Fiber Material is subsidiary to PCO Inlet.

SHEET NO.
9

APPROVED: *L. E. H.*
Development Coordinator
DATE: 7/26/12

Texas Department of Transportation		Bridge Division Standard	
CURB AND GUTTER TRANSITION DETAILS FOR PCO INLET			
CGT-PCO			
FILE: presd13.dgn	OR: TxDOT	EN: AES	DR: JTR
DATE: January 2015	CONF: S&CT	JOB: 200	REVISION:
BY: JTR	CHECK: GCH/PT	DATE: 7/26/12	SHEET NO. 9

CGT-PCO

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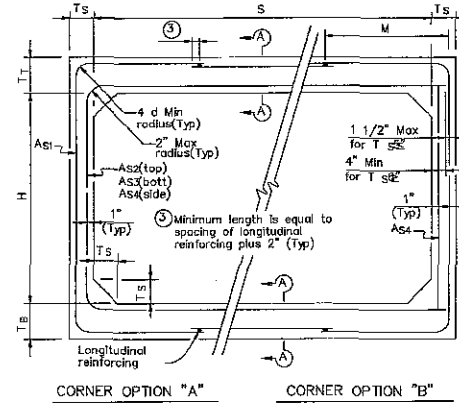
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BOX DATA

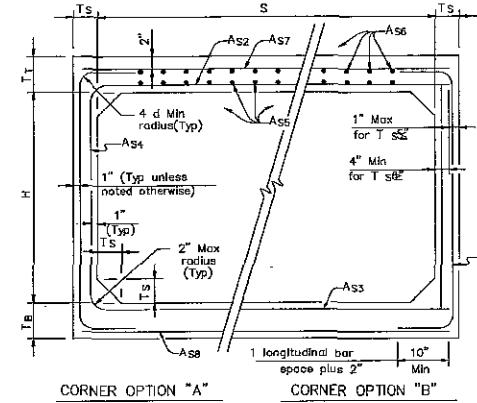
SECTION DIMENSIONS					FILL Height (ft)	M (in)	REINFORCING (in ² /ft) ②								Lift Weight (Tons)
S (ft)	H (ft)	T _T (in)	T _B (in)	T _S (in)			A _{S1}	A _{S2}	A _{S3}	A _{S4}	A _{S5}	A _{S6}	A _{S7}	A _{S8}	
4	2	7.5	6	5	<2	—	0.18	0.27	0.15	0.12	0.18	0.18	0.18	0.14	4.5
4	2	5	5	5	2-3	38	0.18	0.19	0.17	0.12	—	—	—	—	3.6
4	2	5	5	5	3-5	38	0.13	0.13	0.13	0.12	—	—	—	—	3.6
4	2	5	5	5	10	38	0.12	0.12	0.12	0.12	—	—	—	—	3.6
4	2	5	5	5	15	38	0.14	0.16	0.16	0.12	—	—	—	—	3.6
4	2	5	5	5	20	38	0.16	0.20	0.21	0.12	—	—	—	—	3.6
4	2	5	5	5	25	38	0.23	0.25	0.25	0.12	—	—	—	—	3.6
4	2	5	5	5	30	38	0.28	0.30	0.30	0.12	—	—	—	—	3.6
4	3	7.5	6	5	<2	—	0.18	0.31	0.18	0.12	0.18	0.18	0.18	0.14	5.0
4	3	5	5	5	2-3	38	0.15	0.23	0.20	0.12	—	—	—	—	4.1
4	3	5	5	5	3-5	38	0.12	0.16	0.16	0.12	—	—	—	—	4.1
4	3	5	5	5	10	38	0.12	0.14	0.14	0.12	—	—	—	—	4.1
4	3	5	5	5	15	38	0.12	0.18	0.18	0.12	—	—	—	—	4.1
4	3	5	5	5	20	38	0.14	0.23	0.24	0.12	—	—	—	—	4.1
4	3	5	5	5	25	38	0.17	0.29	0.29	0.12	—	—	—	—	4.1
4	3	5	5	5	30	38	0.21	0.35	0.35	0.12	—	—	—	—	4.1
4	4	7.5	6	5	<2	—	0.18	0.33	0.20	0.12	0.18	0.18	0.18	0.14	5.5
4	4	5	5	5	2-3	38	0.12	0.26	0.23	0.12	—	—	—	—	4.6
4	4	5	5	5	3-5	38	0.12	0.18	0.18	0.12	—	—	—	—	4.6
4	4	5	5	5	10	38	0.12	0.15	0.15	0.12	—	—	—	—	4.6
4	4	5	5	5	15	38	0.12	0.19	0.20	0.12	—	—	—	—	4.6
4	4	5	5	5	20	38	0.12	0.25	0.25	0.12	—	—	—	—	4.6
4	4	5	5	5	25	38	0.14	0.31	0.31	0.12	—	—	—	—	4.6
4	4	5	5	5	30	38	0.17	0.37	0.37	0.12	—	—	—	—	4.6

① For Box Length = 8'-0"

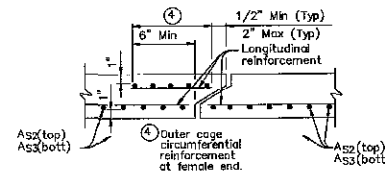
② A_{S1} thru A_{S4}, A_{S7} and A_{S8} are minimum required areas of reinforcement per linear foot of box length. A_{S5} and A_{S6} are minimum required areas of reinforcement per linear foot of box width.



FILL HEIGHT 2 FT AND GREATER



FILL HEIGHT LESS THAN 2 FT



SECTION A-A

(TOP AND BOTTOM SLAB JOINT REINFORCEMENT)

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown. All concrete shall be Class "H" Concrete with a minimum compressive strength of 5,000 psi. See SCP-4 MD standard sheet for miscellaneous details and notes not shown. In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Shop plans for alternate designs shall be submitted in accordance with item "Precast Concrete Structural Members (Fabrication)".

SHEET NO.
10

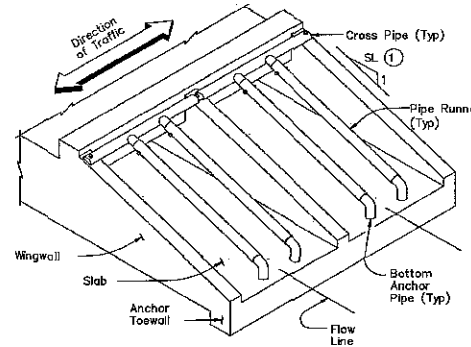
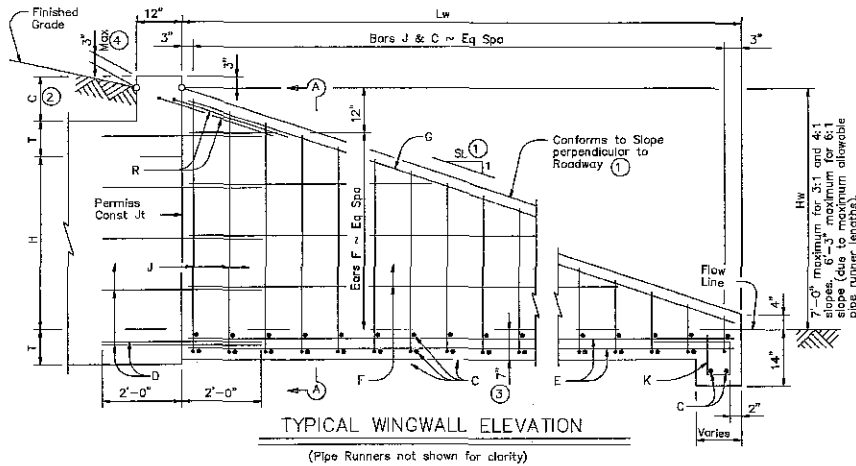
APPROVED: *[Signature]*
Development Coordinator
DATE: *3/26/17*

HL93 LOADING

Texas Department of Transportation		Bridge Division Standard	
SINGLE BOX CULVERTS			
PRECAST			
4' - 0" SPAN			
SCP - 4			
FILE: scp4stda.dgn	REV: 04/17	REV: 04/17	REV: 04/17
01/2007 P&B/08/17/2010	02/07	03/07	04/07
DESIGN	CHECK	APPROVE	DATE

SHEET 1 - (OF 4)

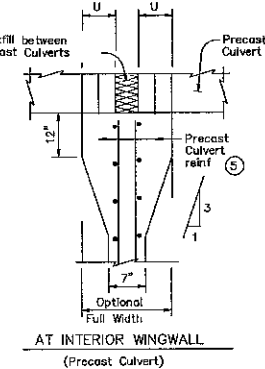
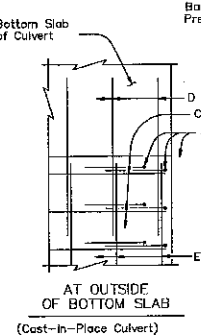
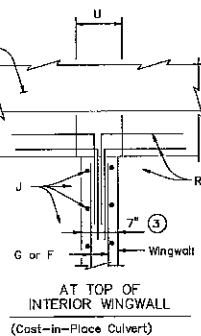
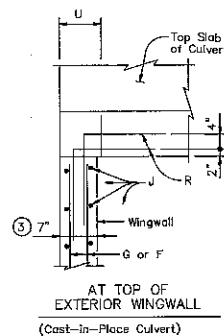
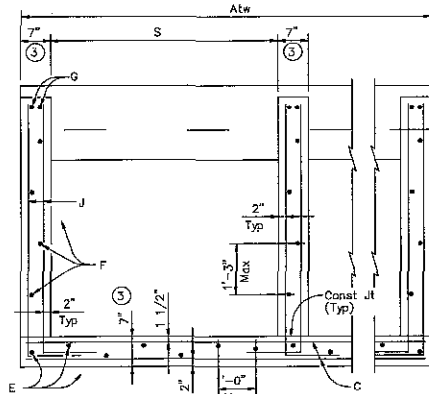
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Formulas: (All values are in Feet)
 $Hw = H + T + C - 0.250'$
 $Lw = (Hw - 0.333') (SL)$
 For Cast-in-place culverts:
 $Atw = (N) (S) - (N) (T) (U)$
 For Precast culverts:
 $Atw = (N) (2U - S) - (N) (T) (0.500')$
 Total Wingwall Area (S.F.)
 $= (0.5) (Hw - 0.333') (Lw) (N) (1) +$
 $= [(Wingwall Area) (0.583') +$
 $(Lw) (Atw) (0.583')]$
 $(Atw) (1.167') (1.167') (0.583') (27) +$
 Pipe Runner Length
 $= (Lw) (K1) (t-917')$
 Total Reinforcing (Lbs)
 $= (1.55) (Lw) (Atw) +$
 $(4.3) (Atw) (K2) (Hw) (N) (1) (Lw) \sqrt{}$

C = Height of Curb above top of Top Slab
 Hw = Height of Wingwall
 K = Constant Value for use in formulas
 Slope SL:1 K1 K2
 3:1 ~ 1.054 ~ 7.45
 4:1 ~ 1.031 ~ 8.48
 6:1 ~ 1.014 ~ 10.30
 Atw = Anchor Towall Length
 Lw = Length of Wingwall
 N = Number of Culvert Barrels
 SL:1 = Side Slope Ratio (Horizontal : 1 Vertical)
 See applicable box culvert standard for H, S, T, and U values.

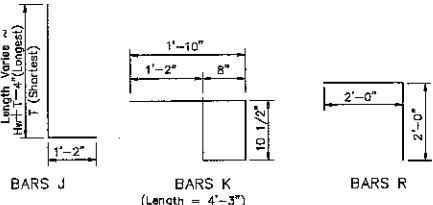
GENERAL NOTES:
 Designed according to AASHTO LRFD Specifications.
 The Safety End Treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Pipe Runners.
 Pipe Runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 220-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.
 All reinforcing steel shall be Grade 60. All reinforcing shall be adjusted as necessary to provide a minimum clear cover of 1 1/4".
 All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi.
 The quantities for Pipe Runners, reinforcing steel, and concrete, resulting from the formulas given herein are for Contractor's information only.
 Pipe Runners, Cross Pipes, and Anchor Pipes shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.
 Bolts and nuts shall conform to ASTM A307.
 All steel components, except the concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.
 See BCS standard sheet for additional dimensions and information.
 Alternate design drawings bearing the seal of a professional engineer will be acceptable for precast construction of the Safety End Treatments.



PLAN VIEWS OF CORNER DETAILS

TABLE OF REINFORCING BAR SIZES & SPACING		
Bar	Size	Spacing
C	#4	10" Max
D	#4	match F & E
E	#4	1'-0" Max
F	#4	1'-3" Max
G	#5	Shown
J	#4	10" Max
K	#4	1'-0" Max
R	#4	Shown

- Recommended values of slope are: 3:1, 4:1, & 6:1. Slope shall be 3:1 or flatter.
- 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures without rolling and curbs taller than 1'-0", refer to ECD standard.
- Wingwall and slab thicknesses may be the same as the adjacent culvert wall and slab thicknesses (7" Minimum). If thicknesses greater than the minimum (7") are used, no changes will be made in quantities and no additional compensation will be allowed.
- For vehicle safety, curbs shall project no more than 3" above finished grade. Curb heights shall be reduced, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- For Culverts with C = 0", the precast culvert reinforcing may extend 1'-0" minimum into Wingwall. Wingwall Bars D and R may be omitted. Otherwise, refer to the "Wingwall Connection Detail" on the SCP-WD standard.



SHEET NO. 11

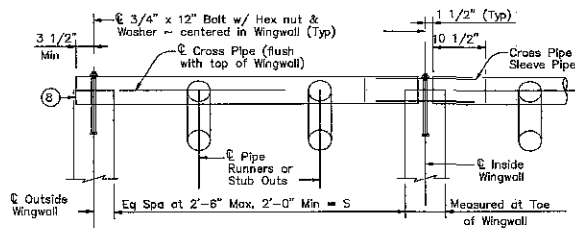
APPROVED: [Signature]
 Development Coordinator
 DATE: 7/24/12

SHEET 1 OF 2

Texas Department of Transportation		Bridge Division Standard	
SAFETY END TREATMENT			
FOR 0° SKEW BOX CULVERTS			
(MAXIMUM HW = 7'-0")			
TYPE I - CROSS DRAINAGE			
SETB-CD			
FILE: SETB-CD-01	APP. DATE: 1/1/00	LOC. DATE: 1/1/00	DES. DATE: 1/1/00
©TxDOT February 2010	DATE: 1/1/00	DATE: 1/1/00	DATE: 1/1/00
REVISION	DATE	BY	REVISION
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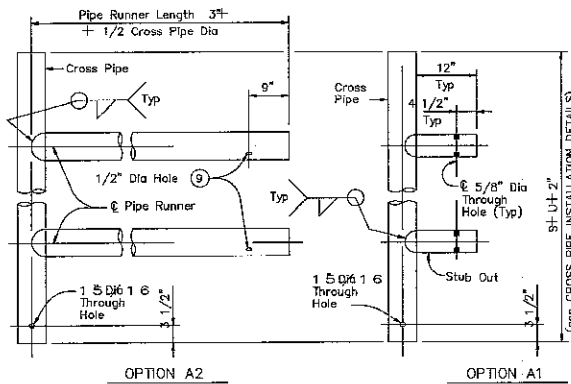
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DATE
FILED



NOTE: At Contractor's option, the Cross Pipe may be made continuous across the Inside Wingwalls. If such option is selected, the Sleeve Pipe shall be omitted and a $\frac{1}{2}$ \"/>

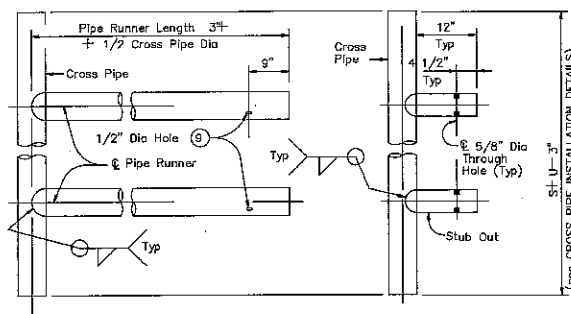
CROSS PIPE INSTALLATION DETAILS



OPTION A2

OPTION A1

FOR USE IN OUTSIDE CULVERT BAY

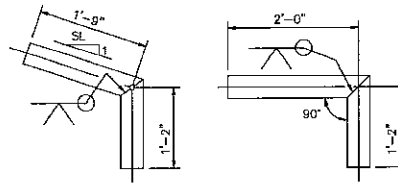


OPTION A2

OPTION A1

FOR USE IN INSIDE CULVERT BAY

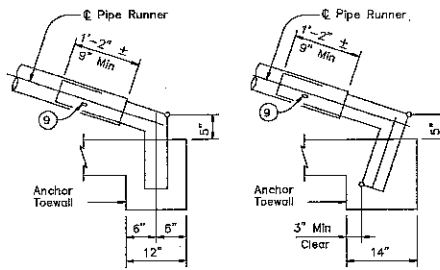
CROSS PIPE AND CONNECTIONS DETAILS



OPTION A

OPTION B

BOTTOM ANCHOR PIPE DETAILS

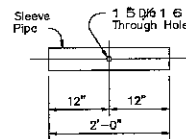


OPTION B1

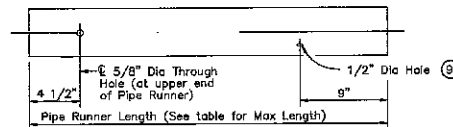
OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Wingwall not shown for clarity)



CROSS PIPE SLEEVE PIPE DETAILS

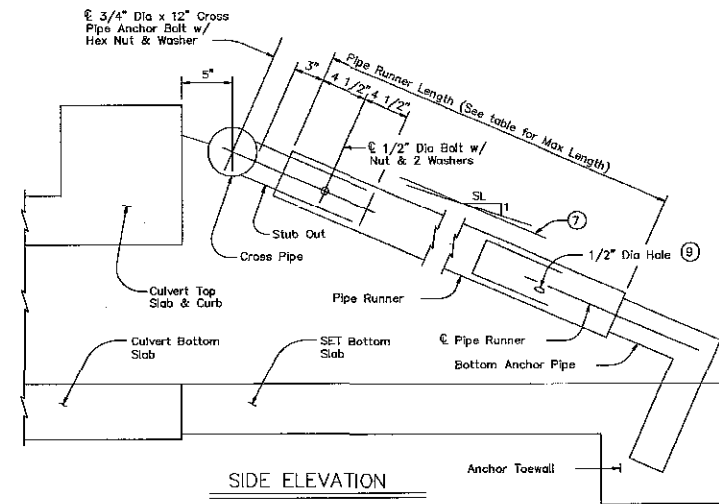


NOTE: The separate Pipe Runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

- ⑥ Cross Pipe shall be the same size as the Pipe Runner. Cross Pipe Stub Out shall be the same size as the Anchor Pipe.
- ⑦ Note that actual slope of Safety Pipe Runner may vary slightly from Side Slope.
- ⑧ Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access.
- ⑨ After installation, the 1/2\"/>

Maximum Pipe Runner Length	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe O.D.	Pipe I.D.	Pipe Size	Pipe O.D.	Pipe I.D.
10' - 0"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19' - 8"	4" STD	4.500"	4.026"	3" STD	3.500"	3.058"
34' - 2"	5" STD	5.563"	5.047"	4" STD	4.500"	4.025"



SIDE ELEVATION

(Showing Pipe Runner with Cross Pipe Connection option A1 and anchor Pipe option B2. Wingwall not shown for clarity)

SHEET 2 OF 2

Texas Department of Transportation
Bridge Division Standard

SAFETY END TREATMENT
FOR 0° SKEW BOX CULVERTS
(MAXIMUM HW = 7' - 0")
TYPE I - CROSS DRAINAGE

SETB-CD

APPROVED: *[Signature]*
Development Coordinator
DATE: 7/20/12

FILE: setbdecv.dgn	DATE: February 2010	BY: JAY	CHK: JAY
REVISION:	DATE:	BY:	CHK:

SHEET 2 - (SETB-CD)

DATE: _____
PAGE: _____

The drawing is a detailed elevation of a wingwall. Key features include:

- Top Left:** 'Finished Grade' label with a 3" dimension and a 'Max' label with a circled plus sign.
- Top Center:** 'Bars J & C ~ Eq Spa' label.
- Top Right:** A 3" dimension and a '3"' label.
- Right Side:** A vertical dimension of 'Hw (7'-0" Max)' and a 'Flow Line' label.
- Bottom Right:** Dimensions of 1'-0", 2", and 14".
- Center:** A vertical dimension of 12" and a label 'Bars F ~ Eq Spa'.
- Left Side:** Dimensions of 2'-0" and 2'-0", and a 'Permiss Const Jt' label.
- Annotations:** 'C (Adjust bar locations as necessary to clear Cross Pipes)', 'SI ①', and circled numbers 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

TYPICAL WINGWALL ELEVATION

(Cross Pipes not shown for clarity)

[illegible]

Length Varies ~
1/2" (Longest)
1/2" (Shortest)

1'-2"

1'-10"

1'-2"

8"

10 1/2"

BARS J

BARS K
(Length = 4'-3")

2'-0"

2'-0"

BARS R

Bar	Size	Spacing
C	#4	10" Max
D	#4	match F & E
E	#4	1'- 0" Max
F	#4	3'- 3" Max
G	#6	Shown
J	#4	10" Max
K	#4	1'- 0" Max
R	#4	Shown

- ① Slope will be 6:1 or flatter.
- ② 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to ECD standard.
- ③ Wingwall and slab thicknesses may be the same as the adjacent culvert wall and slab thicknesses (7" Minimum). If thicknesses greater than the minimum (7") are used, no changes will be made in quantities and no additional compensation will be allowed.
- ④ For vehicle safety, curbs shall project no more than 3" above finished grade. Curb heights shall be reduced, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- ⑤ For Culverts with $C = 0.01$, the present culvert reinforcing may extend 1'-0" minimum into Wingwall. Wingwall Bars D and R may be omitted. Otherwise, refer to the "Wingwall Connection Detail" on the SCP-MD standard.

Formulas: (All values are in Feet)

$$Hw = H + T + G - 0.250'$$

$$Lw = (Hw - 0.250') (SL)$$

For Cast-in-place culverts:

$$Atw = (N) (S) \quad \overline{N} \quad \overline{T} \quad (U)$$

For Precast culverts:

$$Atw = (N) (2U - S) \quad \overline{N} \quad \overline{T} \quad (0.500')$$

$$\text{Total Wingwall Area (S.F.)} = (0.5) (Hw - 0.250') (Lw) (N \quad T) +$$

$$\text{Total Concrete Volume (C.Y.)} = \frac{[(Wingwall Area) (0.583') + (Lw) (Atw) (0.583') + (Atw) (1.000') (1.167' - 0.583')]}{(27)} \div$$

$$\text{Total Reinforcing (Lbs)} = (1.35) (Lw) (Atw) + (4.43) (Atw) (K) (Hw) (N \quad T) (Lw) \quad +$$

C = Height of Curb above top of Top Slab
Hw = Height of Wingwall
K = Constant Value for use in formulas
Slope SL:1 = $\frac{K}{6.1} \sim 10:41$
Atw = Anchor Towell Length
Lw = Length of Wingwall
N = Number of Culvert Barrels
S = Clear Span of each Barrel
SL:1 = Side Slope Ratio (Horizontal : 1 Vertical)

See applicable box culvert standard for H, S, T, and U values.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

The Safety End Treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Cross Pipes.

Cross Pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-27, "Safety Treatment of Retarded-Drainage Structures," Texas Transportation Institute, March 1981.

All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi.

Reinforcing Steel Pipes shall be Grade 60. All reinforcing shall be adjusted as necessary to provide a minimum clear cover of 1 1/4".

The quantities for concrete, reinforcing steel, and cross pipes are approximate quantities given herein are for Contractor's information only.

Cross Pipes, Sleeve Pipes, and Saddle Pipes All conform to the following specifications: A53 (Type B, S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Bolts and nuts shall conform to ASTM A307.

Reinforcing components, except the concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

See BCS standard sheet for additional dimensions and information.

Alternate design drawings bearing the seal of a Professional Engineer will be acceptable for precast construction of the Safety End Treatments.

SHEET 1 OF 2



SAFETY END TREATMENT
FOR BOX CULVERTS
(MAXIMUM Hw = 7' - 0")
TYPE I - PARALLEL DRAINAGE

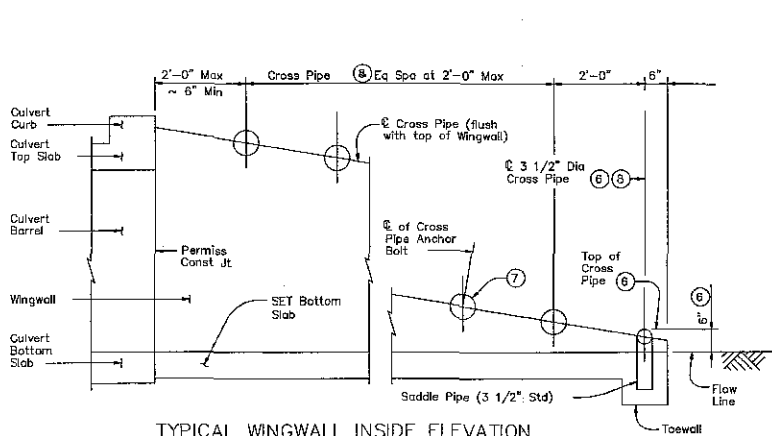
SETB-PD

FILE: sethposp.dgn	DR: GAF	DR: CAT	DR: JRP	DR: GAF
DATE: February 2010	CONF: J00	REV: J00	J00	
REVISION:	CONF: J00	REV: J00	J00	
CONF: J00	REV: J00	CONF: J00	REV: J00	CONF: J00

SHEET 1 - (SETBPD1)

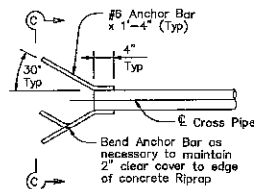
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE



TYPICAL WINGWALL INSIDE ELEVATION

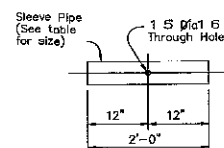
(Showing Installation of Cross Pipes)



PART PLAN

SECTION C-C

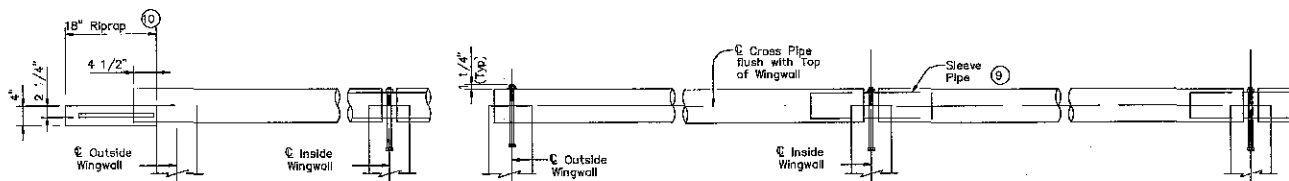
OPTIONAL ANCHOR BAR DETAILS



SLEEVE PIPE DETAILS

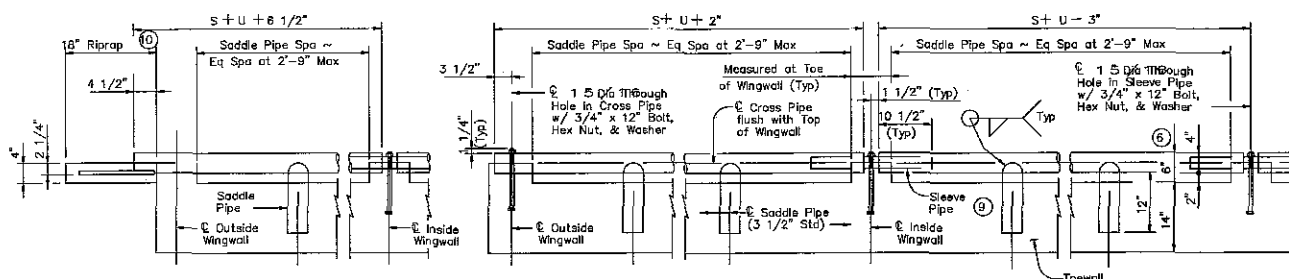
REQUIRED PIPE SIZES (8)			STANDARD PIPE SIZES		
Culvert Span Sizes	Cross Pipe Size	Sleeve Pipe Size (9)	Pipe Size	Pipe O.D.	Pipe I.D.
First Pipe	3 1/2" STD	2 1/2" STD	2 1/2" STD	2.875"	2.469"
30" to 42"	4" STD	3" STD	3" STD	3.500"	3.085"
48" to 72"	5" STD	4" STD	3 1/2" STD	4.000"	3.548"
78" to 120"	6" STD	5" STD	4" STD	4.500"	4.026"
			5" STD	5.563"	5.047"
			6" STD	6.625"	6.065"

- (5) The proper installation of the first Cross Pipe is critical for vehicle safety. The top of the first Cross Pipe must be placed at no more than 6" above the flow line.
- (7) The third Cross Pipe from the bottom of the Culvert shall always be installed using a bolted connection. Care shall be taken to ensure that concrete does not flow into this Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access.
- (8) Cross Pipes and Sleeve Pipes (if required) shall be as shown in the REQUIRED PIPE SIZES table. Saddle Pipes for the 3 1/2" first Cross Pipe shall also be 3 1/2".
- (9) At Contractor's option, the Cross Pipe may be continuous across the inside Wingwalls. If such option is selected, the Sleeve Pipe shall be omitted and a 1" diameter through hole made in the Cross Pipe to accept the anchor bolt at the centerline of each interior Wingwall.
- (10) Riprap will be required when using the optional Anchor Bar details and shall be included in the Price Bid for Safety End Treatment. Such Riprap shall be concrete Riprap in accordance with item 432, "Riprap".



SECTION THROUGH INSTALLATION OF TYPICAL FULL CROSS PIPE

(Anchor details and dimensions are similar to those shown below in SECTION THROUGH INSTALLATION OF 3 1/2" FIRST CROSS PIPE detail.)



SECTION THROUGH INSTALLATION OF 3 1/2" FIRST CROSS PIPE

OUTSIDE CULVERT BARREL WITH OPTIONAL ANCHOR BARS & RIPRAP

OUTSIDE CULVERT BARREL WITH BOLTED ANCHOR

INSIDE CULVERT BARREL

CROSS PIPE INSTALLATION DETAILS

SHEET NO. 14

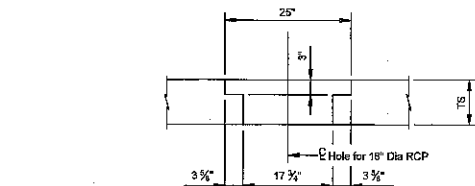
APPROVED: [Signature]
DATE: 7/26/12
Development Coordinator

SHEET 2 OF 2

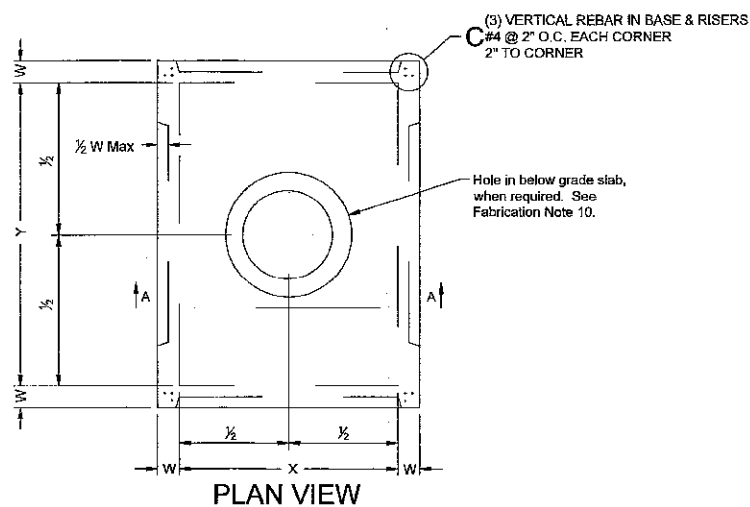
Texas Department of Transportation		Bridge Division Standard	
SAFETY END TREATMENT			
FOR BOX CULVERTS			
(MAXIMUM Hw = 7' - 0")			
TYPE I - PARALLEL DRAINAGE			
SETB-PD			
FILED: setbpdn.dgn	REV: 04/12	REV: 04/12	REV: 04/12
©TxDOT February 2018			
REVISIONS			
NO.	DATE	BY	CHK
01	04/12	01	01

SHEET 2 - (SETB-PD)

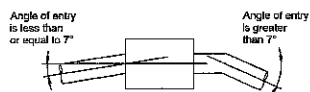
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the consequences of any use of this standard for any purpose other than that for which it was intended or for damages resulting from its use.



DETAIL "B"



PLAN VIEW



PIPE CONNECTION DETAIL

Connect pipes within 7" of normal to PJB wall.
If necessary, use pipe elbow or curved approach
alignment to stay within this limit.

FABRICATION NOTES:

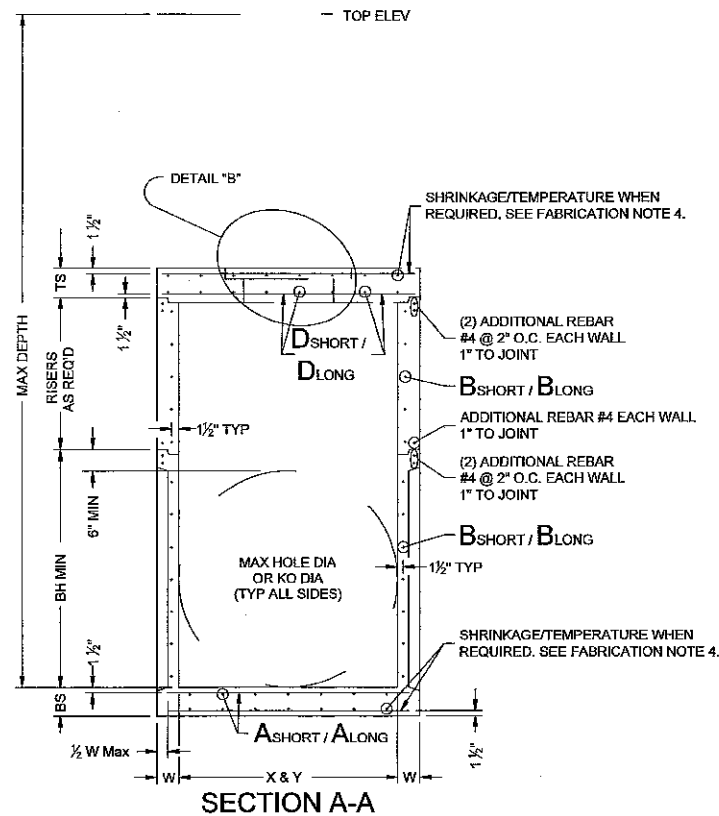
1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWF.
3. Provide typical clear cover of 1 1/2" to reinforcing steel at interior or exterior walls.
4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in²/ft each way.
5. No substitution is allowed for vertical and horizontal #4 bars in corners.
6. Manufacture base and risers to nearest 3" increment.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is 3/4".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. See sheet POD for sizes, dimensions, and reinforcing steel not shown.
10. Provide hole in below grade slab only when PJB is installed with inlet type POD.

INSTALLATION NOTES:

1. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to junction box.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or 1/2 the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. For flexible pipe, consult Manufacturer's specification for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's specification.

GENERAL NOTES:

1. Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab. See sheet POD for sizes.
2. Designed according to ASTM C913.
3. Payment for junction box is per Item 465 "Junction Boxes, Manholes, and Inlets" by type and size.



SECTION A-A

Cover dimensions are clear dimensions, unless noted otherwise.

SHEET NO.
15

APPROVED: *[Signature]*
Developing Coordinator
DATE: 7/28/17

HL93 LOADING

Texas Department of Transportation
Bridge Division Standard

PRECAST JUNCTION BOX

PJB

FILE	DATE	BY	CHK	DATE	BY	CHK	DATE	BY	CHK
precast.pjb	January 2015	CHW	CHW	JCH	CHW	CHW	CHW	CHW	CHW
REVISED									
DATE				COUNTY					

SHEET 1 - (P.15)

TABLE OF VARIABLE DIMENSIONS
AND QUANTITIES FOR ONE HEADWALL

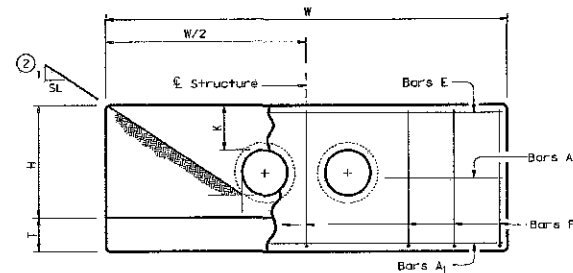
Values for one Pipe				Values to be added for each additional Pipe			
W	X	Y	L	Reinf. (Lbs.)	Reinf. (Lbs.)	X and W	Reinf. (Lbs.)
12'-0"	2'-0"	9'-10"	3'-3 1/4"	84	0.6	1'-9"	20
15'-0"	2'-0"	9'-10"	3'-3 1/4"	98	0.7	2'-2"	24
18'-0"	2'-0"	9'-10"	3'-3 1/4"	112	0.8	2'-8"	28
21'-0"	2'-0"	9'-10"	3'-3 1/4"	126	0.9	2'-8"	32
24'-0"	2'-0"	9'-10"	3'-3 1/4"	140	1.0	3'-1"	36
27'-0"	2'-0"	9'-10"	3'-3 1/4"	154	1.1	3'-1"	40
30'-0"	2'-0"	9'-10"	3'-3 1/4"	168	1.2	3'-1"	44
33'-0"	2'-0"	9'-10"	3'-3 1/4"	182	1.3	3'-1"	48
36'-0"	2'-0"	9'-10"	3'-3 1/4"	196	1.4	3'-1"	52
39'-0"	2'-0"	9'-10"	3'-3 1/4"	210	1.5	3'-1"	56
42'-0"	2'-0"	9'-10"	3'-3 1/4"	224	1.6	3'-1"	60
45'-0"	2'-0"	9'-10"	3'-3 1/4"	238	1.7	3'-1"	64
48'-0"	2'-0"	9'-10"	3'-3 1/4"	252	1.8	3'-1"	68
51'-0"	2'-0"	9'-10"	3'-3 1/4"	266	1.9	3'-1"	72
54'-0"	2'-0"	9'-10"	3'-3 1/4"	280	2.0	3'-1"	76
57'-0"	2'-0"	9'-10"	3'-3 1/4"	294	2.1	3'-1"	80
60'-0"	2'-0"	9'-10"	3'-3 1/4"	308	2.2	3'-1"	84
63'-0"	2'-0"	9'-10"	3'-3 1/4"	322	2.3	3'-1"	88
66'-0"	2'-0"	9'-10"	3'-3 1/4"	336	2.4	3'-1"	92
69'-0"	2'-0"	9'-10"	3'-3 1/4"	350	2.5	3'-1"	96
72'-0"	2'-0"	9'-10"	3'-3 1/4"	364	2.6	3'-1"	100
75'-0"	2'-0"	9'-10"	3'-3 1/4"	378	2.7	3'-1"	104
78'-0"	2'-0"	9'-10"	3'-3 1/4"	392	2.8	3'-1"	108
81'-0"	2'-0"	9'-10"	3'-3 1/4"	406	2.9	3'-1"	112
84'-0"	2'-0"	9'-10"	3'-3 1/4"	420	3.0	3'-1"	116
87'-0"	2'-0"	9'-10"	3'-3 1/4"	434	3.1	3'-1"	120
90'-0"	2'-0"	9'-10"	3'-3 1/4"	448	3.2	3'-1"	124
93'-0"	2'-0"	9'-10"	3'-3 1/4"	462	3.3	3'-1"	128
96'-0"	2'-0"	9'-10"	3'-3 1/4"	476	3.4	3'-1"	132
99'-0"	2'-0"	9'-10"	3'-3 1/4"	490	3.5	3'-1"	136
102'-0"	2'-0"	9'-10"	3'-3 1/4"	504	3.6	3'-1"	140
105'-0"	2'-0"	9'-10"	3'-3 1/4"	518	3.7	3'-1"	144
108'-0"	2'-0"	9'-10"	3'-3 1/4"	532	3.8	3'-1"	148
111'-0"	2'-0"	9'-10"	3'-3 1/4"	546	3.9	3'-1"	152
114'-0"	2'-0"	9'-10"	3'-3 1/4"	560	4.0	3'-1"	156
117'-0"	2'-0"	9'-10"	3'-3 1/4"	574	4.1	3'-1"	160
120'-0"	2'-0"	9'-10"	3'-3 1/4"	588	4.2	3'-1"	164
123'-0"	2'-0"	9'-10"	3'-3 1/4"	602	4.3	3'-1"	168
126'-0"	2'-0"	9'-10"	3'-3 1/4"	616	4.4	3'-1"	172
129'-0"	2'-0"	9'-10"	3'-3 1/4"	630	4.5	3'-1"	176
132'-0"	2'-0"	9'-10"	3'-3 1/4"	644	4.6	3'-1"	180
135'-0"	2'-0"	9'-10"	3'-3 1/4"	658	4.7	3'-1"	184
138'-0"	2'-0"	9'-10"	3'-3 1/4"	672	4.8	3'-1"	188
141'-0"	2'-0"	9'-10"	3'-3 1/4"	686	4.9	3'-1"	192
144'-0"	2'-0"	9'-10"	3'-3 1/4"	700	5.0	3'-1"	196
147'-0"	2'-0"	9'-10"	3'-3 1/4"	714	5.1	3'-1"	200
150'-0"	2'-0"	9'-10"	3'-3 1/4"	728	5.2	3'-1"	204
153'-0"	2'-0"	9'-10"	3'-3 1/4"	742	5.3	3'-1"	208
156'-0"	2'-0"	9'-10"	3'-3 1/4"	756	5.4	3'-1"	212
159'-0"	2'-0"	9'-10"	3'-3 1/4"	770	5.5	3'-1"	216
162'-0"	2'-0"	9'-10"	3'-3 1/4"	784	5.6	3'-1"	220
165'-0"	2'-0"	9'-10"	3'-3 1/4"	798	5.7	3'-1"	224
168'-0"	2'-0"	9'-10"	3'-3 1/4"	812	5.8	3'-1"	228
171'-0"	2'-0"	9'-10"	3'-3 1/4"	826	5.9	3'-1"	232
174'-0"	2'-0"	9'-10"	3'-3 1/4"	840	6.0	3'-1"	236
177'-0"	2'-0"	9'-10"	3'-3 1/4"	854	6.1	3'-1"	240
180'-0"	2'-0"	9'-10"	3'-3 1/4"	868	6.2	3'-1"	244
183'-0"	2'-0"	9'-10"	3'-3 1/4"	882	6.3	3'-1"	248
186'-0"	2'-0"	9'-10"	3'-3 1/4"	896	6.4	3'-1"	252
189'-0"	2'-0"	9'-10"	3'-3 1/4"	910	6.5	3'-1"	256
192'-0"	2'-0"	9'-10"	3'-3 1/4"	924	6.6	3'-1"	260
195'-0"	2'-0"	9'-10"	3'-3 1/4"	938	6.7	3'-1"	264
198'-0"	2'-0"	9'-10"	3'-3 1/4"	952	6.8	3'-1"	268
201'-0"	2'-0"	9'-10"	3'-3 1/4"	966	6.9	3'-1"	272
204'-0"	2'-0"	9'-10"	3'-3 1/4"	980	7.0	3'-1"	276
207'-0"	2'-0"	9'-10"	3'-3 1/4"	994	7.1	3'-1"	280
210'-0"	2'-0"	9'-10"	3'-3 1/4"	1008	7.2	3'-1"	284
213'-0"	2'-0"	9'-10"	3'-3 1/4"	1022	7.3	3'-1"	288
216'-0"	2'-0"	9'-10"	3'-3 1/4"	1036	7.4	3'-1"	292
219'-0"	2'-0"	9'-10"	3'-3 1/4"	1050	7.5	3'-1"	296
222'-0"	2'-0"	9'-10"	3'-3 1/4"	1064	7.6	3'-1"	300
225'-0"	2'-0"	9'-10"	3'-3 1/4"	1078	7.7	3'-1"	304
228'-0"	2'-0"	9'-10"	3'-3 1/4"	1092	7.8	3'-1"	308
231'-0"	2'-0"	9'-10"	3'-3 1/4"	1106	7.9	3'-1"	312
234'-0"	2'-0"	9'-10"	3'-3 1/4"	1120	8.0	3'-1"	316
237'-0"	2'-0"	9'-10"	3'-3 1/4"	1134	8.1	3'-1"	320
240'-0"	2'-0"	9'-10"	3'-3 1/4"	1148	8.2	3'-1"	324
243'-0"	2'-0"	9'-10"	3'-3 1/4"	1162	8.3	3'-1"	328
246'-0"	2'-0"	9'-10"	3'-3 1/4"	1176	8.4	3'-1"	332
249'-0"	2'-0"	9'-10"	3'-3 1/4"	1190	8.5	3'-1"	336
252'-0"	2'-0"	9'-10"	3'-3 1/4"	1204	8.6	3'-1"	340
255'-0"	2'-0"	9'-10"	3'-3 1/4"	1218	8.7	3'-1"	344
258'-0"	2'-0"	9'-10"	3'-3 1/4"	1232	8.8	3'-1"	348
261'-0"	2'-0"	9'-10"	3'-3 1/4"	1246	8.9	3'-1"	352
264'-0"	2'-0"	9'-10"	3'-3 1/4"	1260	9.0	3'-1"	356
267'-0"	2'-0"	9'-10"	3'-3 1/4"	1274	9.1	3'-1"	360
270'-0"	2'-0"	9'-10"	3'-3 1/4"	1288	9.2	3'-1"	364
273'-0"	2'-0"	9'-10"	3'-3 1/4"	1302	9.3	3'-1"	368
276'-0"	2'-0"	9'-10"	3'-3 1/4"	1316	9.4	3'-1"	372
279'-0"	2'-0"	9'-10"	3'-3 1/4"	1330	9.5	3'-1"	376
282'-0"	2'-0"	9'-10"	3'-3 1/4"	1344	9.6	3'-1"	380
285'-0"	2'-0"	9'-10"	3'-3 1/4"	1358	9.7	3'-1"	384
288'-0"	2'-0"	9'-10"	3'-3 1/4"	1372	9.8	3'-1"	388
291'-0"	2'-0"	9'-10"	3'-3 1/4"	1386	9.9	3'-1"	392
294'-0"	2'-0"	9'-10"	3'-3 1/4"	1400	10.0	3'-1"	396
297'-0"	2'-0"	9'-10"	3'-3 1/4"	1414	10.1	3'-1"	400
300'-0"	2'-0"	9'-10"	3'-3 1/4"	1428	10.2	3'-1"	404
303'-0"	2'-0"	9'-10"	3'-3 1/4"	1442	10.3	3'-1"	408
306'-0"	2'-0"	9'-10"	3'-3 1/4"	1456	10.4	3'-1"	412
309'-0"	2'-0"	9'-10"	3'-3 1/4"	1470	10.5	3'-1"	416
312'-0"	2'-0"	9'-10"	3'-3 1/4"	1484	10.6	3'-1"	420
315'-0"	2'-0"	9'-10"	3'-3 1/4"	1498	10.7	3'-1"	424
318'-0"	2'-0"	9'-10"	3'-3 1/4"	1512	10.8	3'-1"	428
321'-0"	2'-0"	9'-10"	3'-3 1/4"	1526	10.9	3'-1"	432
324'-0"	2'-0"	9'-10"	3'-3 1/4"	1540	11.0	3'-1"	436
327'-0"	2'-0"	9'-10"	3'-3 1/4"	1554	11.1	3'-1"	440
330'-0"	2'-0"	9'-10"	3'-3 1/4"	1568	11.2	3'-1"	444
333'-0"	2'-0"	9'-10"	3'-3 1/4"	1582	11.3	3'-1"	448
336'-0"	2'-0"	9'-10"	3'-3 1/4"	1596	11.4	3'-1"	452
339'-0"	2'-0"	9'-10"	3'-3 1/4"	1610	11.5	3'-1"	456
342'-0"	2'-0"	9'-10"	3'-3 1/4"	1624	11.6	3'-1"	460
345'-0"	2'-0"	9'-10"	3'-3 1/4"	1638	11.7	3'-1"	464
348'-0"	2'-0"	9'-10"	3'-3 1/4"	1652	11.8	3'-1"	468
351'-0"	2'-0"	9'-10"	3'-3 1/4"	1666	11.9	3'-1"	472
354'-0"	2'-0"	9'-10"	3'-3 1/4"	1680	12.0	3'-1"	476
357'-0"	2'-0"	9'-10"	3'-3 1/4"	1694	12.1	3'-1"	480
360'-0"	2'-0"	9'-10"	3'-3 1/4"	1708	12.2	3'-1"	484
363'-0"	2'-0"	9'-10"	3'-3 1/4"	1722	12.3	3'-1"	488
366'-0"	2'-0"	9'-10"	3'-3 1/4"	1736	12.4	3'-1"	492
369'-0"	2'-0"	9'-10"	3'-3 1/4"	1750	12.5	3'-1"	496
372'-0"	2'-0"	9'-10"	3'-3 1/4"	1764	12.6	3'-1"	500
375'-0"	2'-0"	9'-10"	3'-3 1/4"	1778	12.7	3'-1"	504
378'-0"	2'-0"	9'-10"	3'-3 1/4"	1792	12.8	3'-1"	508
381'-0"	2'-0"	9'-10"	3'-3 1/4"	1806	12.9	3'-1"	512
384'-0"	2'-0"	9'-10"	3'-3 1/4"	1820	13.0	3'-1"	516
387'-0"	2'-0"	9'-10"	3'-3 1/4"	1834	13.1	3'-1"	520
390'-0"	2'-0"	9'-10"	3'-3 1/4"	1848	13.2	3'-1"	524
393'-0"	2'-0"	9'-10"	3'-3 1/4"	1862	13.3	3'-1"	528
396'-0"	2'-0"	9'-10"	3'-3 1/4"	1876	13.4	3'-1"	532
399'-0"	2'-0"	9'-10"	3'-3 1/4"	1890	13.5	3'-1"	536
402'-0"	2'-0"	9'-10"	3'-3 1/4"	1904	13.6	3'-1"	540
405'-0"	2'-0"	9'-10"	3'-3 1/4"	1918	13.7	3'-1"	544
408'-0"	2'-0"	9'-10"	3'-3 1/4"	1932	13.8	3'-1"	548
411'-0"	2'-0"	9'-10"	3'-3 1/4"	1946	13.9	3'-1"	552
414'-0"	2'-0"	9'-10"	3'-3 1/4"	1960	14.0	3'-1"	556
417'-0"	2'-0"	9'-10"	3'-3 1/4"	1974	14.1	3'-1"	560
420'-0"	2'-0"	9'-10"	3'-3 1/4"	1988	14.2	3'-1"	564
423'-0"	2'-0"	9'-10"	3'-3 1/4"	2002	14.3	3'-1"	568
426'-0"	2'-0"	9'-10"	3'-3 1/4"	2016	14.4	3'-1"	572
429'-0"	2'-0"	9'-10"	3'-3 1/4"	2030	14.5	3'-1"	576
432'-0"	2'-0"	9'-10"	3'-3 1/4"	2044	14.6	3'-1"	580
435'-0"	2'-0"	9'-10"	3'-3 1/4"	2058	14.7	3'-1"	584
438'-0"	2'-0"	9'-10"	3'-3 1/4"	2072	14.8	3'-1"	588
441'-0"	2'-0"	9'-10"	3'-3 1/4"	2086	14.9	3'-1"	592
444'-0"	2'-0"	9'-10"	3'-3 1/4"	2100	15.0	3'-1"	596
447'-0"	2'-0"	9'-10"	3'-3 1/4"	2114	15.1	3'-1"	600
450'-0"	2'-0"	9'-10"	3'-3 1/4"	2128	15.2	3'-1"	604
453'-0"	2'-0"	9'-10"	3'-3 1/4"	2142	15.3	3'-1"	608
456'-0"	2'-0"	9'-10"	3'-3 1/4"	2156	15.4	3'-1"	612
459'-0"	2'-0"	9'-10"	3'-3 1/4"	2170	15.5	3'-1"	616
462'-0"	2'-0"	9'-10"	3'-3 1/4"	2184	15.6	3'-1"	620
465'-0"	2'-0"	9'-10"	3'-3 1/4"	2198	15.7	3'-1"	624
468'-0"	2'-0"	9'-10"	3'-3 1/4"	2212	15.8	3'-1"	628
471'-0"	2'-0"	9'-10"	3'-3 1/4"	2226	15.9	3'-1"	632
474'-0"	2'-0"	9'-10"	3'-3 1/4"	2240	16.0	3'-1"	636
477'-0"	2'-0"	9'-10"	3'-3 1/4"	2254	16.1	3'-1"	640
480'-0"	2'-0"						

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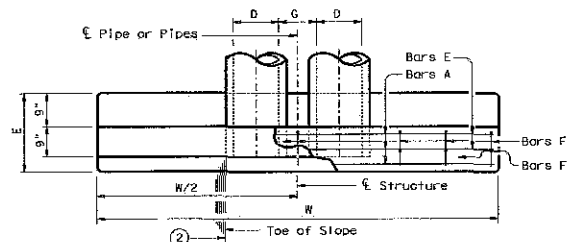
DATE: 7/28/17
FILE:

TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL ⁽⁴⁾					
SLOPE DIAL OF PILES	Values for one Pipe			Values to be added for each odd 1 Pipe	
	W	Reinf (Lbs)	Conc (CY)	W	Reinf (Lbs)
12"	9'-0"	122	1.1	1'-9"	15
15"	10'-3"	136	1.3	2'-2"	16
18"	11'-6"	163	1.5	2'-8"	19
21"	12'-9"	200	1.8	3'-1"	31
24"	14'-0"	217	2.1	3'-7"	34
27"	15'-3"	254	2.4	3'-11"	37
30"	16'-6"	272	2.7	4'-4"	40
33"	17'-9"	314	3.1	4'-8"	43
36"	19'-0"	371	3.9	5'-1"	46
42"	21'-6"	442	4.9	5'-10"	52
48"	25'-0"	569	6.4	6'-7"	59
54"	27'-6"	701	7.5	7'-6"	82
60"	30'-0"	794	8.8	8'-3"	90
66"	32'-6"	894	10.2	8'-9"	96
72"	35'-0"	1055	11.7	9'-4"	103
12"	13'-0"	175	1.6	1'-9"	14
15"	14'-9"	183	1.9	2'-2"	17
18"	16'-6"	228	2.2	2'-8"	19
21"	18'-3"	299	2.6	3'-1"	31
24"	20'-0"	323	3.0	3'-7"	33
27"	21'-9"	371	3.5	3'-11"	37
30"	23'-6"	415	4.0	4'-4"	40
33"	25'-3"	469	4.6	4'-8"	43
36"	27'-0"	556	5.7	5'-1"	46
42"	30'-6"	675	7.1	5'-10"	52
48"	35'-6"	837	9.2	6'-7"	59
54"	39'-0"	1015	11.0	7'-6"	84
60"	42'-6"	1171	12.9	8'-3"	91
66"	46'-0"	1298	14.9	8'-9"	98
72"	49'-6"	1561	17.1	9'-4"	103
12"	17'-0"	229	2.0	1'-9"	15
15"	19'-3"	266	2.4	2'-2"	17
18"	21'-6"	308	2.9	2'-8"	19
21"	23'-9"	382	3.5	3'-1"	31
24"	26'-0"	430	3.9	3'-7"	34
27"	28'-3"	486	4.7	3'-11"	37
30"	30'-6"	539	5.2	4'-4"	40
33"	32'-9"	603	6.0	4'-8"	42
36"	35'-0"	738	7.5	5'-1"	47
42"	39'-6"	881	9.3	5'-10"	52
48"	46'-0"	1102	12.1	6'-7"	61
54"	50'-6"	1364	14.4	7'-6"	84
60"	55'-0"	1547	16.9	8'-3"	91
66"	59'-6"	1741	19.5	8'-9"	98
72"	64'-0"	2089	22.4	9'-4"	102
12"	25'-0"	336	3.0	1'-9"	14
15"	28'-3"	384	3.6	2'-2"	17
18"	31'-6"	452	4.2	2'-8"	19
21"	34'-9"	581	5.1	3'-1"	31
24"	38'-0"	644	5.8	3'-7"	34
27"	41'-3"	737	6.9	3'-11"	37
30"	44'-6"	807	7.7	4'-4"	39
33"	47'-9"	912	8.9	4'-8"	44
36"	51'-0"	1108	11.0	5'-1"	48
42"	57'-6"	1318	13.7	5'-10"	54
48"	67'-0"	1674	17.9	6'-7"	59
54"	73'-6"	2064	21.3	7'-6"	83
60"	80'-0"	2343	24.9	8'-3"	89
66"	86'-6"	2635	28.9	8'-9"	96
72"	93'-0"	3123	33.1	9'-4"	101

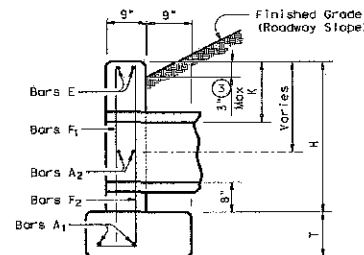
APPROVED: *[Signature]*
Development Coordinator
DATE: 7/28/17



ELEVATION



PLAN OF NON-SKEWED PILES



SECTION

TABLE OF CONSTANT DIMENSIONS					
PIPE D	C	K	H	T	E
12"	9"	1'-0"	2'-8"	9"	1'-9"
15"	11"	1'-0"	2'-11"	9"	1'-9"
18"	1'-2"	1'-0"	3'-2"	9"	1'-9"
21"	1'-4"	1'-0"	3'-5"	9"	2'-0"
24"	1'-7"	1'-0"	3'-8"	9"	2'-0"
27"	1'-8"	1'-0"	3'-11"	9"	2'-3"
30"	1'-10"	1'-0"	4'-2"	9"	2'-3"
33"	1'-11"	1'-0"	4'-5"	9"	2'-6"
36"	2'-1"	1'-0"	4'-8"	1'-0"	2'-6"
42"	2'-4"	1'-0"	5'-2"	1'-0"	2'-9"
48"	2'-7"	1'-3"	5'-11"	1'-0"	3'-0"
54"	3'-0"	1'-3"	6'-5"	1'-0"	3'-3"
60"	3'-3"	1'-3"	6'-11"	1'-0"	3'-6"
66"	3'-3"	1'-3"	7'-5"	1'-0"	3'-9"
72"	3'-4"	1'-3"	7'-11"	1'-0"	4'-0"

TABLE OF REINFORCING STEEL			
Bar	Size	Spa	No.
A1	# 5	~	2
A2	# 5	1'-6"	~
E	# 5	~	2
F	# 5	1'-0"	~

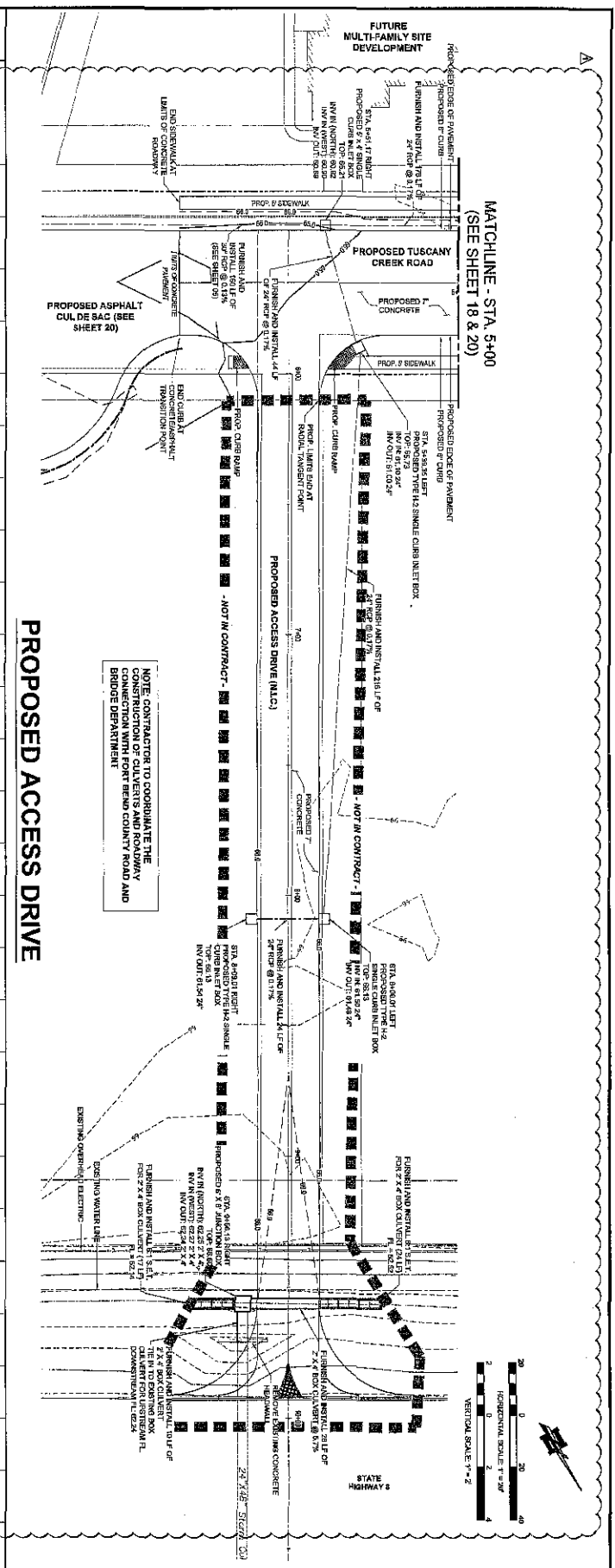
BARS F2

GENERAL NOTES:
Designed according to AASHTO LRFD Specifications.
Reinforcing steel shall be placed with the center of the outside layer of bars 2" from the surface of the concrete.
All reinforcing steel shall be Grade 60.
All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi.
No bridge rails of any type may be mounted directly to these culvert headwalls.

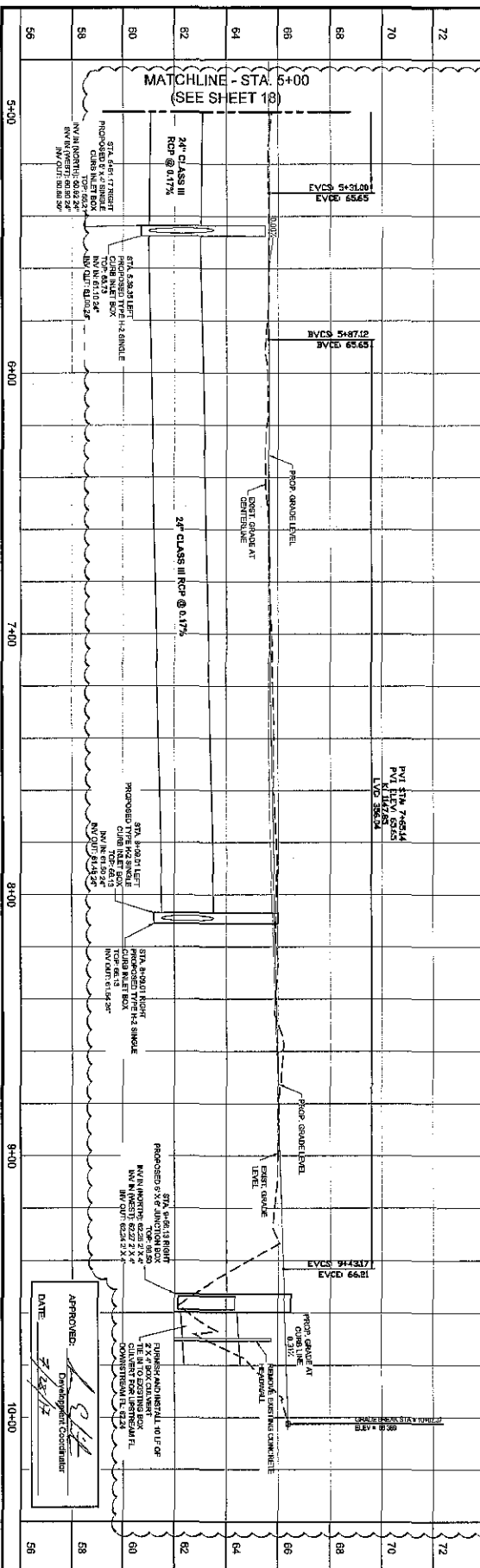
- Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.
- Indicated slope is perpendicular to centerline Pipe or Pipes.
- For vehicle safety, curbs shall project no more than 3" above finished grade. Curb heights shall be reduced, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- Quantities shown are for one structure and only (one headwall).

SHEET NO.
17

Texas Department of Transportation		Bridge Division Standard	
CONCRETE HEADWALLS WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS			
CH-PW-0			
DATE: 01/01/2017	BY: TxDOT	CC: TxDOT	REV: TxDOT
REVISIONS	DATE	BY	REVISION



PROPOSED ACCESS DRIVE



KSA 816 Park Two Dr., Sugar Land, Texas 77478 T: 281-694-2222 F: 281-494-2214 www.ksa-engineers.com	DRAWN BY: CJC DESIGNED BY: COP/PA LATEST REVISION: 07/24/2017 KSA JOB NO.: HBW-017	CITY OF ARCOLA SITE DEVELOPMENT PROJECT ARCOLA, TEXAS	PLAN AND PROFILE PROPOSED ACCESS ROAD (STA. 5+00 TO STA. 9+93)	REVISIONS <table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> </tr> <tr> <td>1</td> <td>07/24/2017</td> <td>ISSUED FOR PERMIT</td> </tr> </table>	NO.	DATE	DESCRIPTION	1	07/24/2017	ISSUED FOR PERMIT
	NO.	DATE	DESCRIPTION							
1	07/24/2017	ISSUED FOR PERMIT								
APPROVED: DATE: 7/24/17 DEVELOPMENT COORDINATOR	19	PROJECT NAME:	SHEET NAME:	REVISIONS <table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> </tr> <tr> <td>1</td> <td>07/24/2017</td> <td>ISSUED FOR PERMIT</td> </tr> </table>	NO.	DATE	DESCRIPTION	1	07/24/2017	ISSUED FOR PERMIT
NO.	DATE	DESCRIPTION								
1	07/24/2017	ISSUED FOR PERMIT								



Philip W.
Harrison, P.E.
BAC

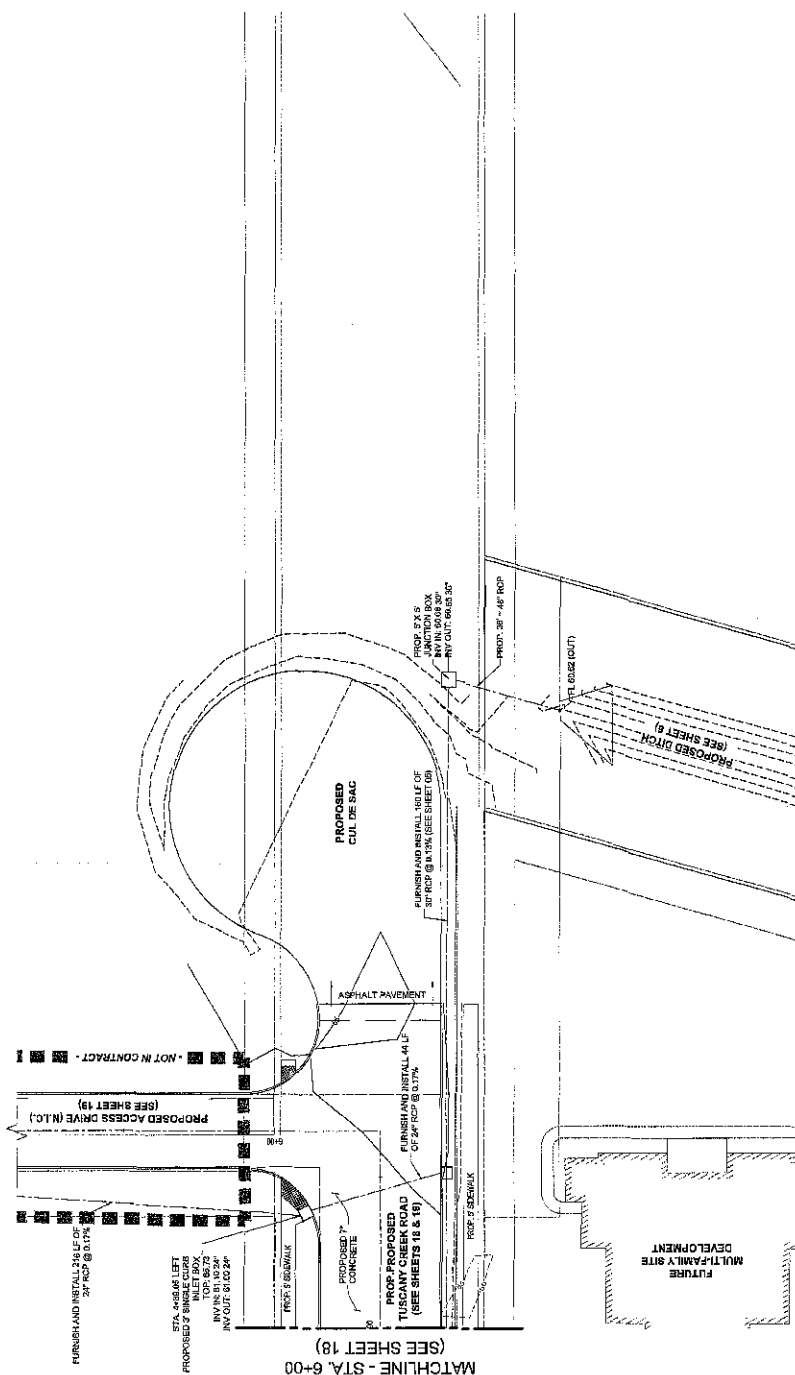
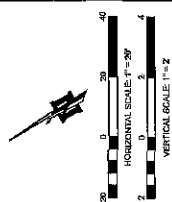
IKSA

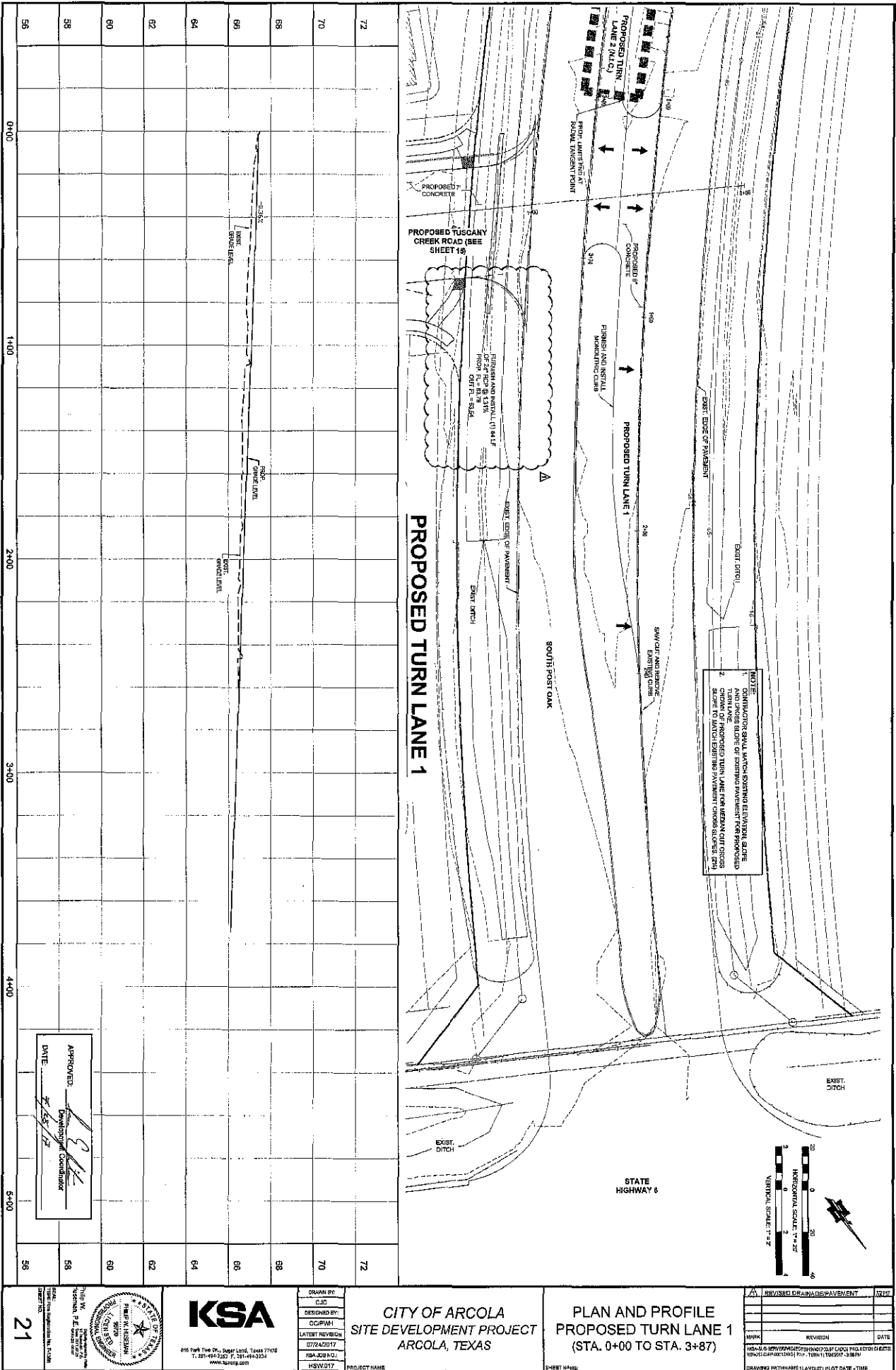
CITY OF ARCOLA
SITE DEVELOPMENT PROJECT
ARCOLA, TEXAS

PLAN VIEW
PROPOSED CUL DE SAC

[illegible]

APPROVED: _____
Development Coordinator





APPROVED: 

DATE: 7/25/17

KSA

616 7th The Dr., Sugar Land, Texas 77478
T: 281-491-3200 F: 281-491-3134
www.ksa-usa.com

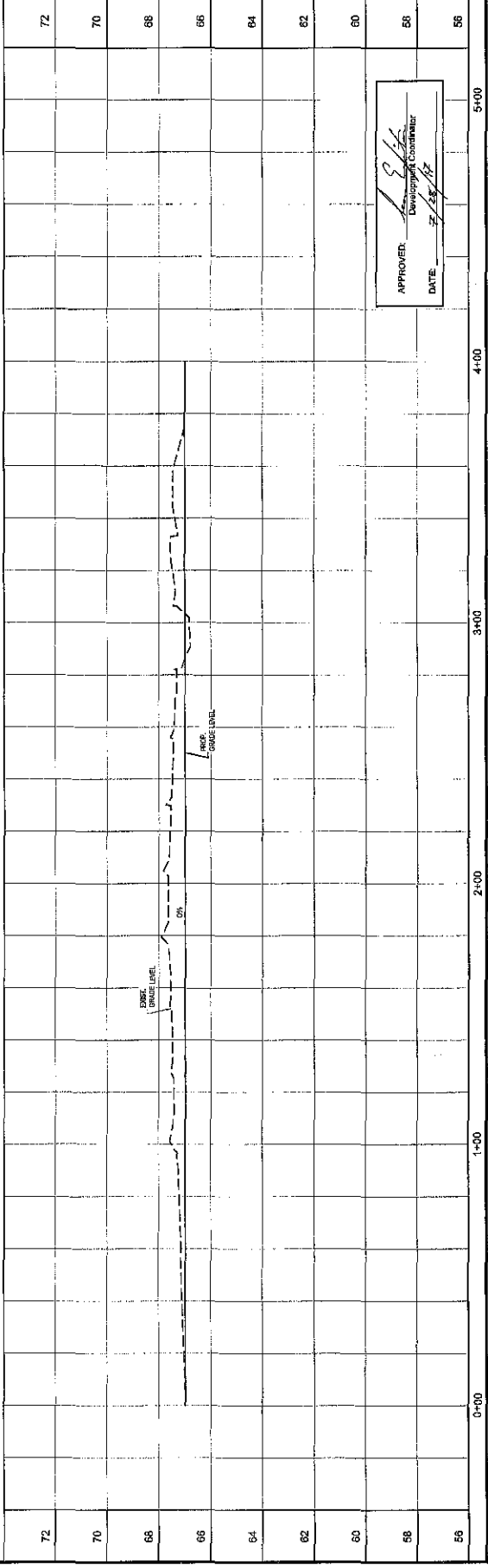
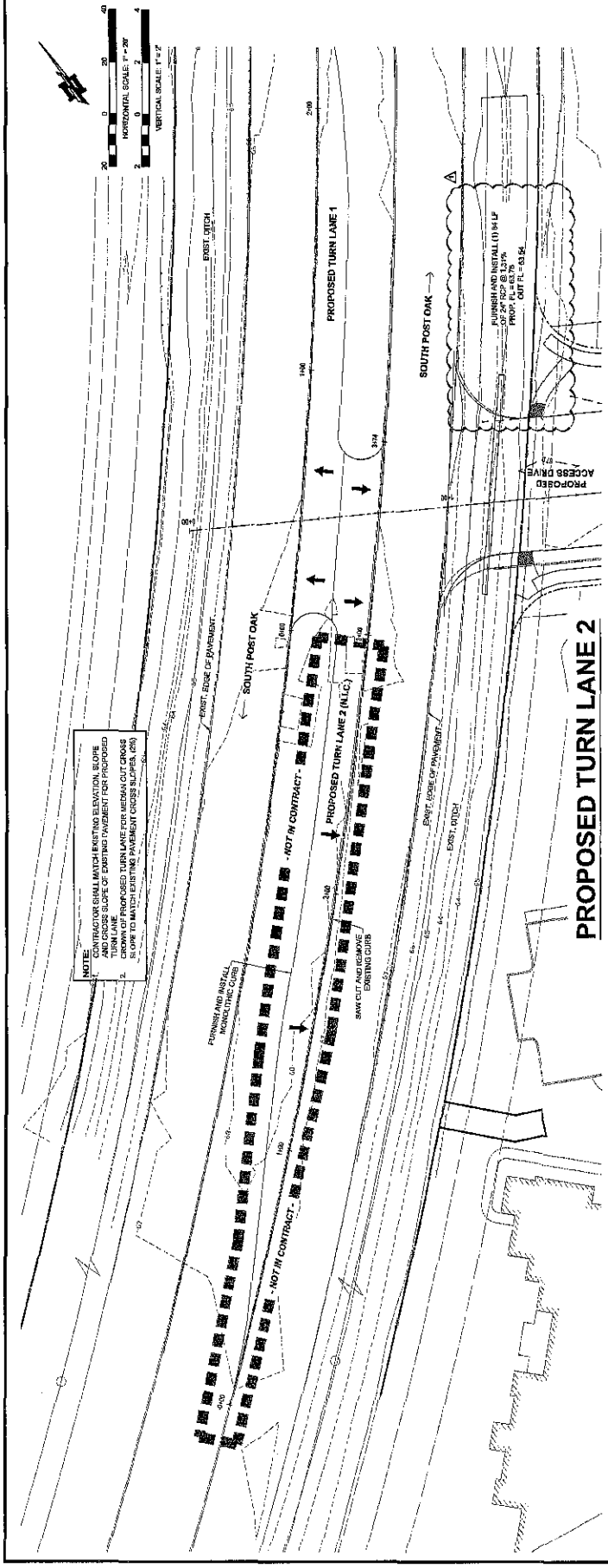
CITY OF ARCOLA
SITE DEVELOPMENT PROJECT
ARCOLA, TEXAS

PLAN AND PROFILE
PROPOSED TURN LANE 1
(STA. 0+00 TO STA. 3+87)

REVISION	DATE	BY
1	7/25/17	DAVID W. JOHNSON

21

HSW217 SITE DEVELOPMENT PROJECT - CITY OF ARCOLA, TEXAS



APPROVED: *[Signature]*
 Development Engineer
 DATE: 7/28/17

REVISION	DATE

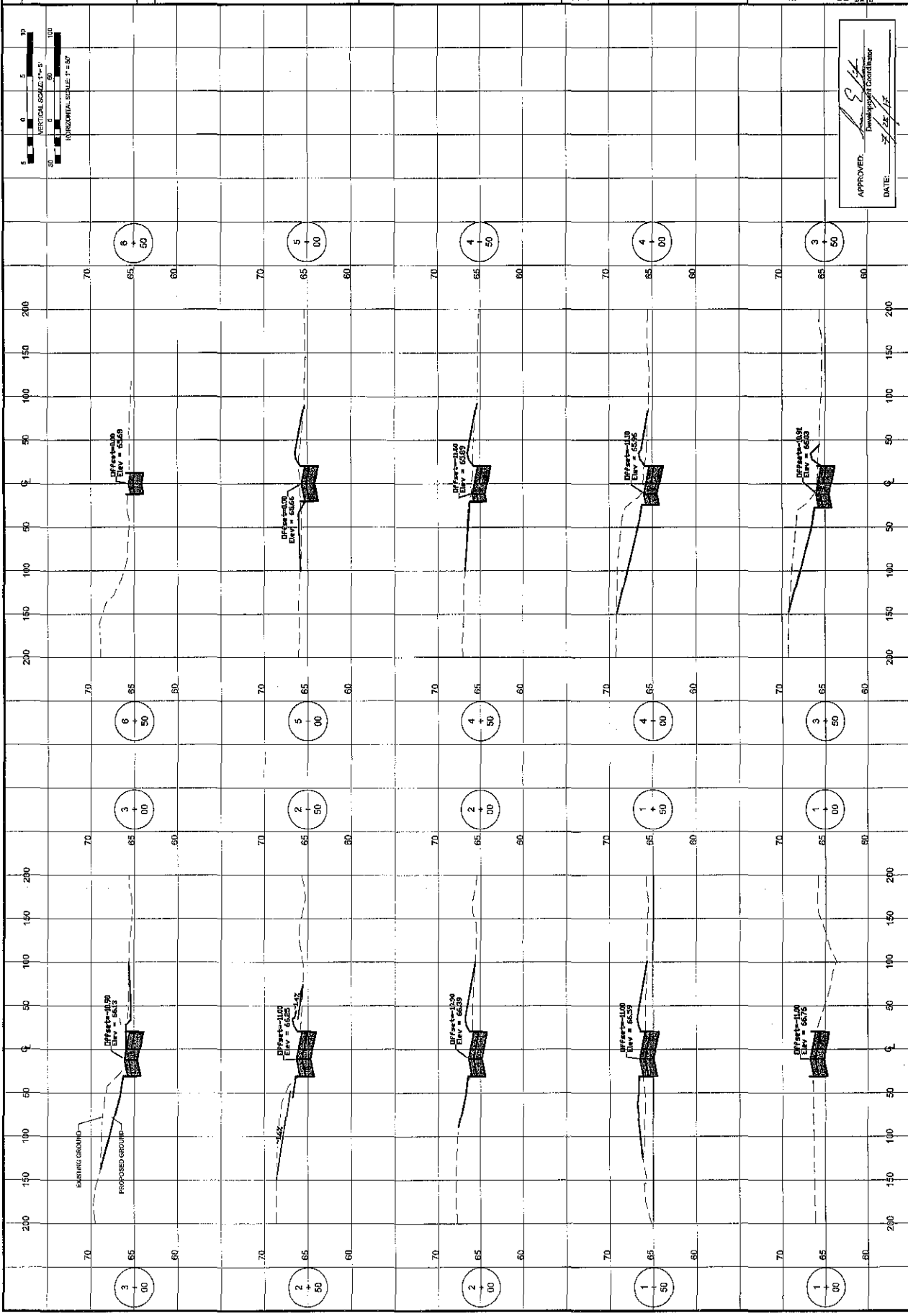
CROSS SECTIONS 1

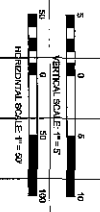
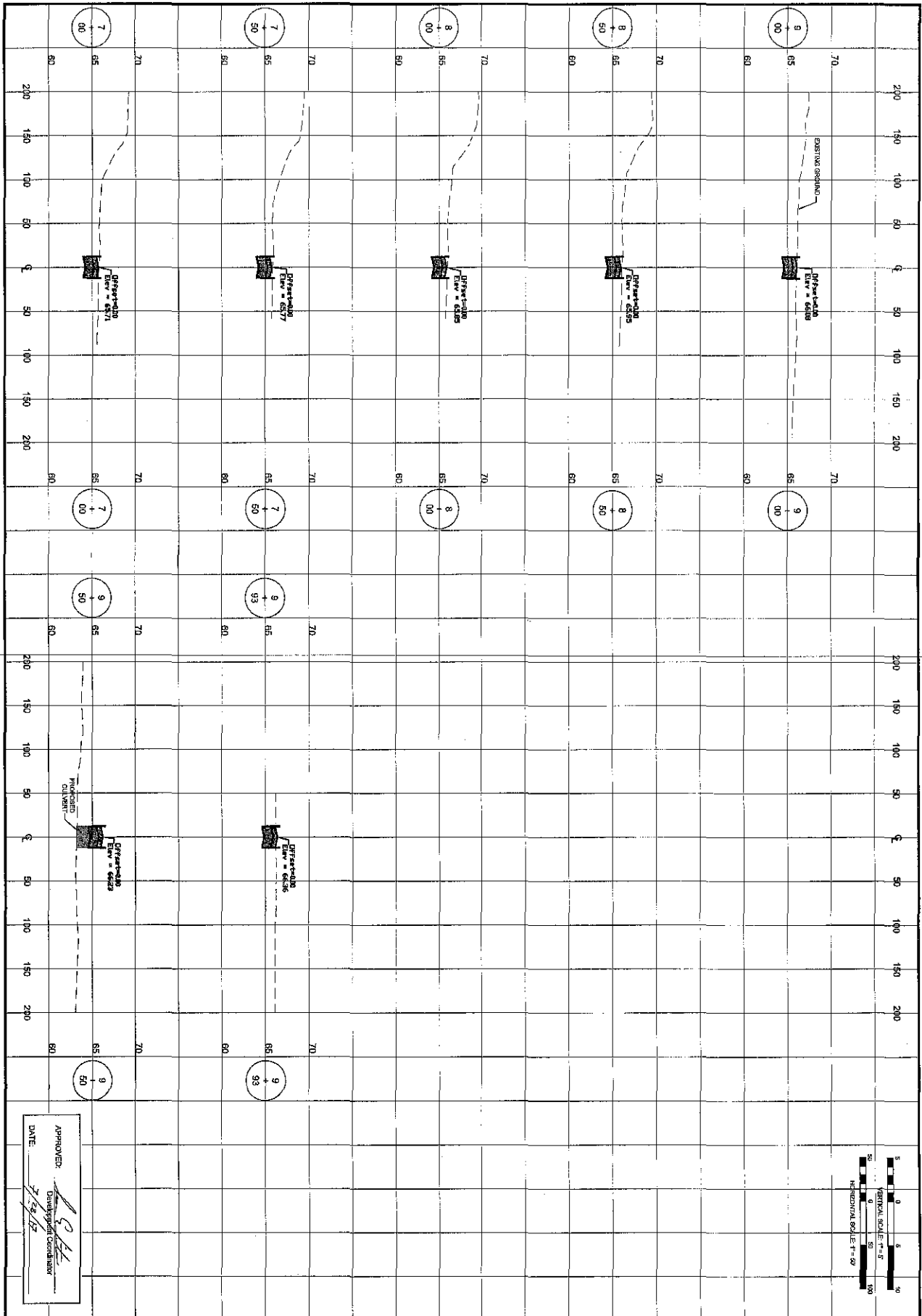
CITY OF ARCOLA
SITE DEVELOPMENT PROJECT
ARCOLA, TEXAS

PROJECT NAME	PROJECT NAME
DATE	DATE
DESIGNED BY	DESIGNED BY
CHECKED BY	CHECKED BY
APPROVED BY	APPROVED BY
DATE	DATE



PHILIP W. FERGUSON
Professional Engineer
State of Texas
License No. 9576
DATE: 12/25/12





APPROVED: *[Signature]*
 DATE: 7/24/17

KSA
 810 Park Two Blvd., Sugar Land, Texas 77478
 T: 281-436-3252 F: 281-464-3234
 www.ksa.com

CITY OF ARCOLA
SITE DEVELOPMENT PROJECT
ARCOLA, TEXAS

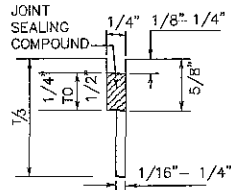
CROSS SECTIONS 2

DATE	REVISION	MARK

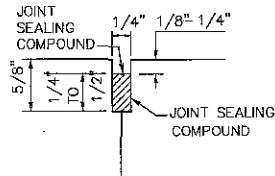
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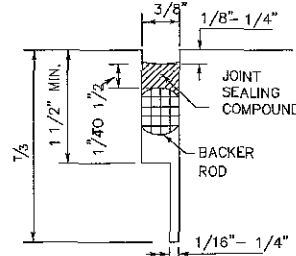
METHOD B: JOINT SEALING COMPOUND



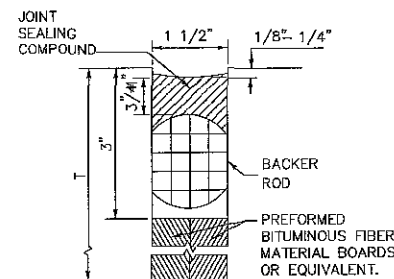
LONGITUDINAL SAWED
CONTRACTION JOINT



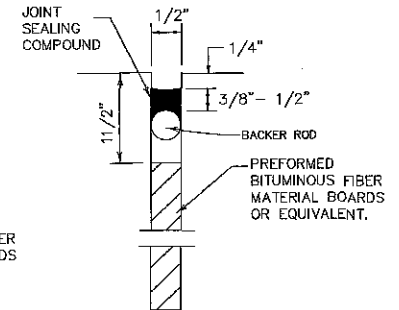
LONGITUDINAL OR TRANSVERSE
CONSTRUCTION JOINT



TRANSVERSE SAWED
CONTRACTION JOINT

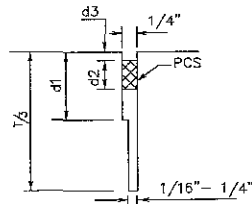


TRANSVERSE FORMED
EXPANSION JOINT

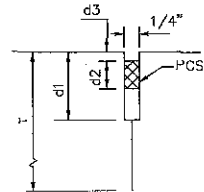


FORMED
ISOLATION JOINT

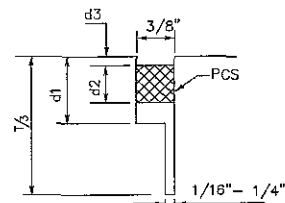
METHOD A: PREFORMED COMPRESSION SEALS (PCS)(DMS-6310 CLASS 6)



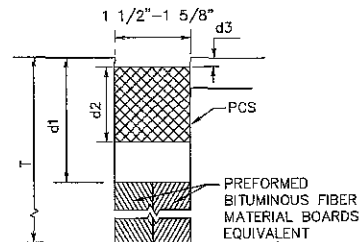
LONGITUDINAL SAWED
CONTRACTION JOINT



LONGITUDINAL
CONSTRUCTION JOINT



TRANSVERSE SAWED
CONTRACTION JOINT



TRANSVERSE FORMED
EXPANSION JOINT

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, EITHER METHOD "A" OR METHOD "B" MAY BE USED.
2. THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
3. THE JOINT RESERVOIR FOR SEALANT OR PCS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND THE SAWED JOINTS.
4. DIMENSIONS d1, d2, AND d3 SHOWN IN METHOD A SHALL BE IN ACCORDANCE WITH THE PREFORMED COMPRESSION SEAL MANUFACTURER'S RECOMMENDATION.
5. REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR THE CLASSIFICATIONS.
6. FOR SAWED LONGITUDINAL JOINT, LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLAN OR APPROVED.
7. FOR TRANSVERSE SAWED CONTRACTION, TRANSVERSE FORMED EXPANSION JOINT, AND ISOLATION JOINT USE JOINT SEALANT CLASS 5 OR 8 AT NEW JOINTS. USE JOINT SEALANT CLASS 4,5,7,OR 8 FOR MAINTAINING EXISTING JOINTS.
8. THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS" OR ITEM 713 "CLEANING AND SEALING JOINTS AND CRACKS (CONCRETE PAVEMENT)".
9. ISOLATION JOINTS ACCOMMODATE HORIZONTAL AND VERTICAL MOVEMENTS THAT OCCUR BETWEEN A PAVEMENT AND A STRUCTURE. ISOLATION JOINTS MAY BE USED FOR BRIDGE ABUTMENTS, INTERSECTIONS, CURB AND GUTTER, OLD AND NEW PAVEMENTS, OR AROUND DRAINAGE INLETS, MANHOLES, FOOTINGS AND LIGHTING STRUCTURES.

SHEET NO.
25

APPROVED: *[Signature]*
Development Coordinator
DATE: *7/15/12*

		Design Division Standard	
CONCRETE PAVING DETAILS JOINT SEALS JS-14			
FILE: JH4.dgn	DATE: 12/01/2014	BY: TUDOT	CHK: AN
PROJECT: 12-000000	SECTION: 12-000000	JOB: 12-000000	REVISION: 12-000000
CITY: 12-000000	COUNTY: 12-000000	SHEET NO.: 12-000000	

APPROVED: [Signature]
Development Coordinator

DATE: 7/28/17



CULVER
N.T.S.

N.Y.

NOTE:

- * BANK SAND IS DEFINED AS A WELL-SORTED SAND, FREE OF SILT, CLAY, LOAM, FRIABLE OR SOLUBLE MATERIALS AND ORGANIC MATTER, MEETING THE UNIFIED SOILS CLASSIFICATION SYSTEM SYMBOL, SW, CRITERIA WITH A PLASTICITY INDEX OF 40, AND NO MORE THAN 12% OF MATERIAL CAN PASS THE NO. 200 SIEVE.
- * SIDEWALK THICKNESS (WHERE REPLACING DRIVEWAY PAVEMENT) WILL BE 6" MIN. REINFORCEMENT WILL BE AS STATED IN THE CONSTRUCTION NOTES.
- * BANK SAND AND JOINT SEALANT FILLER TO BE SUBSIDIARY TO THE INSTALLATION OF THE SIDEWALK.

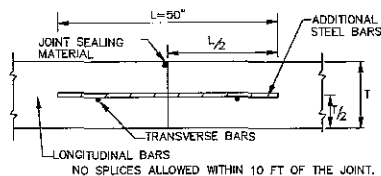
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[illegible]

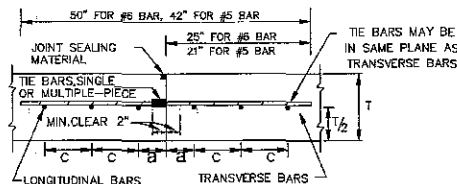
NOTES: The use of this standard is governed by the Texas Engineering Practice Act. No warranty of any kind is made by the Department of Transportation for the use of this standard in other forms or for incorrect results or damages resulting from its use.

TABLE NO.1 LONGITUDINAL STEEL					
SLAB THICKNESS AND BAR SIZE		REGULAR STEEL BARS	FIRST SPACING AT EDGE OR JOINT	ADDITIONAL STEEL BARS AT TRANSVERSE CONSTRUCTION JOINT (SECTION X-X)	
T (IN.)	BAR SIZE	SPACING c (IN.)	SPACING a (IN.)	SPACING 2 x c (IN.)	LENGTH L (IN.)
7.0	#5	6.5	3 TO 4	13	50
7.5	#5	6.0	3 TO 4	12	50
8.0	#6	9.0	3 TO 4	18	50
8.5	#6	8.5	3 TO 4	17	50
9.0	#6	8.0	3 TO 4	16	50
9.5	#6	7.5	3 TO 4	15	50
10.0	#6	7.0	3 TO 4	14	50
10.5	#6	6.75	3 TO 4	13.5	50
11.0	#6	6.5	3 TO 4	13	50
11.5	#6	6.25	3 TO 4	12.5	50
12.0	#6	6.0	3 TO 4	12	50
12.5	#6	5.75	3 TO 4	11.5	50
13.0	#6	5.5	3 TO 4	11	50

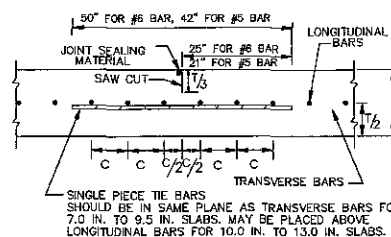
TABLE NO.2 TRANSVERSE STEEL AND TIE BARS						
SLAB THICKNESS (IN.)	TRANSVERSE STEEL		TIE BARS AT LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z)		TIE BARS AT LONGITUDINAL CONTRACTION JOINT (SECTION Y-Y)	
	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
7.0 - 7.5	#5	48	#5	48	#5	24
8.0 - 13.0	#5	48	#6	48	#6	24



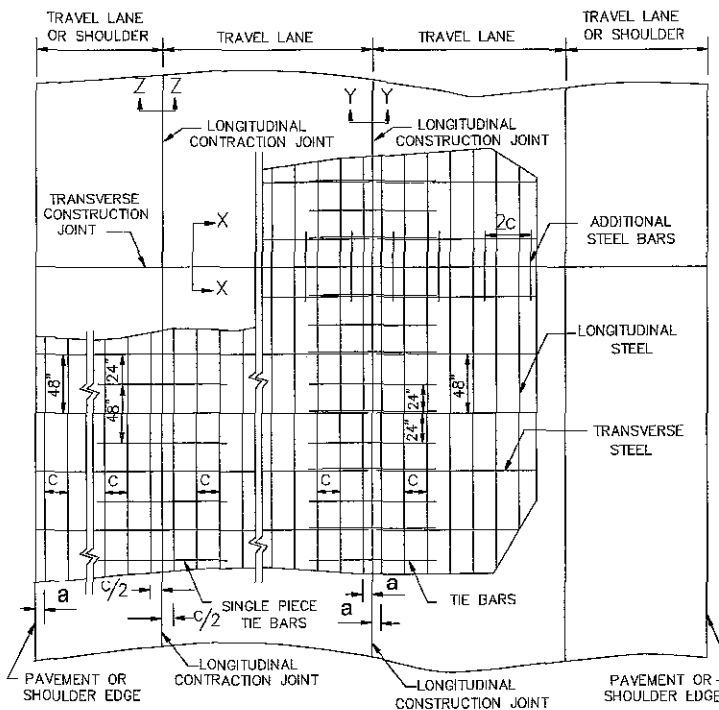
TRANSVERSE CONSTRUCTION JOINT
SECTION X - X



LONGITUDINAL CONSTRUCTION JOINT
SECTION Y - Y



LONGITUDINAL CONTRACTION JOINT
SECTION Z - Z



TYPICAL PAVEMENT LAYOUT
PLAN VIEW (NOT TO SCALE)

GENERAL NOTES

1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT ARE NOT COVERED BY THIS STANDARD.
2. USE COARSE AGGREGATES TO PRODUCE CONCRETE WITH A COEFFICIENT OF THERMAL EXPANSION (CTE) NOT MORE THAN $5.5 \times 10^{-6} \text{ IN/IN/}^\circ\text{F}$.
3. ALL THE REINFORCING STEEL AND TIE BARS SHALL BE DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 80) OR ABOVE. STEEL BAR SIZES AND SPACINGS SHALL CONFORM TO TABLE NO.1 AND TABLE NO.2.
4. WHEN LOW CTE CONCRETE (NOT MORE THAN $4.0 \times 10^{-6} \text{ IN/IN/}^\circ\text{F}$) IS PRODUCED, TABLE NO.1A MAY BE USED FOR LONGITUDINAL STEEL AS APPROVED BY THE ENGINEER.
5. STEEL BAR PLACEMENT TOLERANCE SHALL BE $\pm 1 \text{ IN.}$ HORIZONTALLY AND $\pm 0.5 \text{ IN.}$ VERTICALLY. CALCULATED AVERAGE BAR SPACING (CONCRETE PLACEMENT WIDTH / NUMBER OF LONGITUDINAL BARS) SHALL CONFORM TO TABLE NO.1 OR TABLE NO.1A.
6. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
7. THE SAW CUT DEPTH FOR THE LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z) SHALL BE ONE THIRD OF THE SLAB THICKNESS ($T/3$).
8. WHEN TYING CONCRETE CUTTER AT A LONGITUDINAL JOINT, THE TIE BAR LENGTH OR POSITION MAY BE ADJUSTED. PROVIDE 3 IN. OF CONCRETE COVER FROM THE BACK OF CUTTER TO THE END OF TIE BAR.
9. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN. 10 IN. DEEP AND GROUTING THE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
10. OMIT TIE BARS LOCATED WITHIN 18 IN. OF THE TRANSVERSE CONSTRUCTION JOINTS (SECTION X-X). USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL FORMED JOINTS.
11. LONGITUDINAL REINFORCING STEEL SPLICES SHALL BE A MINIMUM OF 25 IN. STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT.
12. THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."

APPROVED: *[Signature]*
Development Coordinator
DATE: 7/25/12

SHEET 1 OF 2

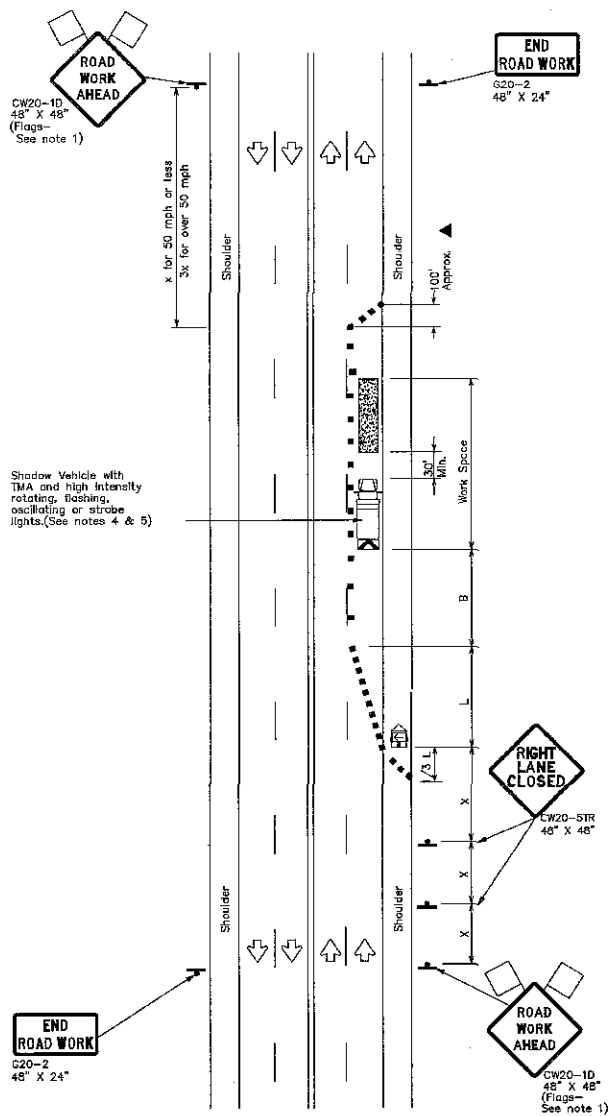
		Design Division Standard	
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT ONE LAYER STEEL BAR PLACEMENT T - 7 TO 13 INCHES CRCP(1)-13			
FILED	PROJECT	DATE	BY
00000	00000	0000	0000
10/10/2011 AND ON THE 04/10/2012 REVISED TO AND CTE REQUIREMENTS		COUNTY	SHEET NO.

SHEET NO.
28

DATE: FILE:

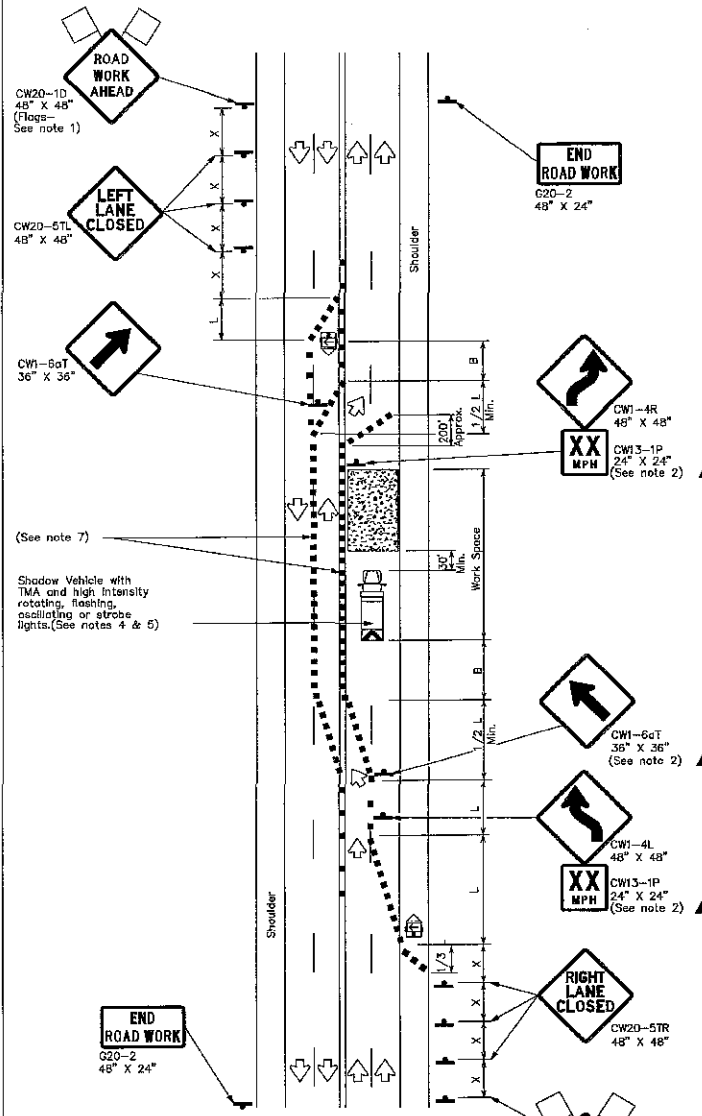
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the consequences of the use of this standard or for incorrect results or damages resulting from its use.

DATE: FILE:



TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

APPROVED: *[Signature]*
Development Coordinator
DATE: 7/25/17

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths **	Suggested Maximum Spacing of Channelizing Devices	Minimum Sign Spacing * Distance	Suggested Longitudinal Buffer Space "B"
30	$WS^2/60$	10' Offset: 150'	On a Taper: 30'	On a Tangent: 60'	120'
35		11' Offset: 165'	On a Taper: 35'	On a Tangent: 70'	160'
40		12' Offset: 180'	On a Taper: 40'	On a Tangent: 80'	240'
45	$1/2 WS$	205'	45'	90'	320'
50		225'	50'	100'	400'
55		245'	55'	110'	500'
60		265'	60'	120'	600'
65		285'	65'	130'	700'
70		320'	70'	140'	800'
75		350'	75'	150'	900'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE			
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	

GENERAL NOTES

- Flags attached to signs where shown are REQUIRED.
 - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
 - The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
 - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
- TCP (1-4g)
- If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline where needed to protect the work space from opposing traffic with the arrow panel placed in the closed lane near the end of the tapering.
- TCP (1-4b)
- Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

SHEET NO. 30

For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for item 502, Barricades, Signs and Traffic Handling.

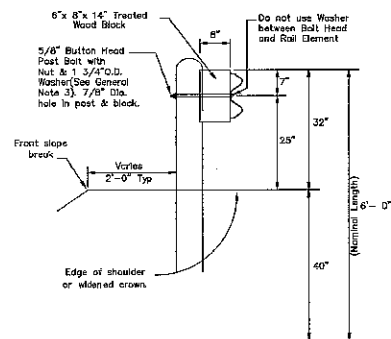
Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

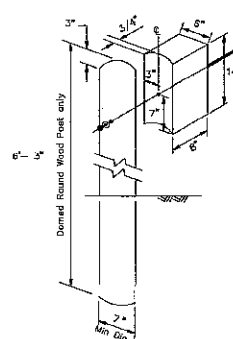
TCP(1-4)-12

REVISIONS	DATE	BY	CHKD	APPD	REASON
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8-05					
1-07					
4-08					
154					

SHEET 11-(709)-412

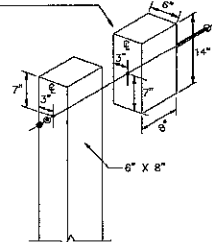
DATE: _____
FILE: _____

TYPICAL POST

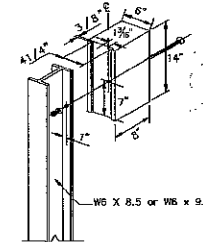


WOOD BLOCK TO
ROUND WOOD POST

Toenail with one 18d Galv.
nail to prevent block rotation

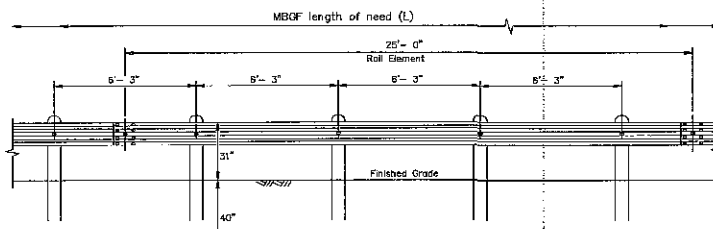


WOOD BLOCK TO
RECTANGULAR WOOD POST



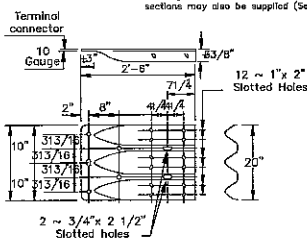
WOOD BLOCK
TO STEEL POST

* Post(s) may require field modification to ensure proper guardrail height.

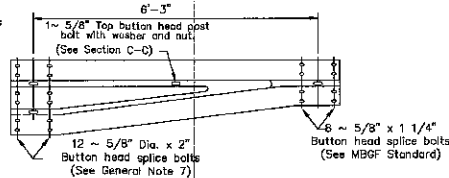


ELEVATION
MID-SPAN RAIL SPLICE

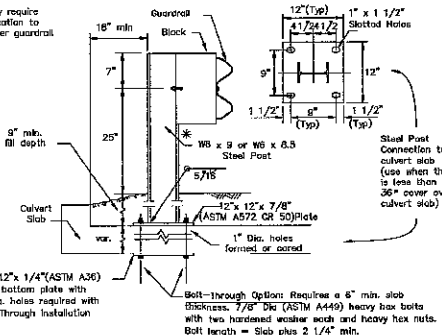
Showing a 25'-0" section of W-Beam rail, 12'-8" rail sections may also be supplied (See General Note 2)



THREE-BEAM TERMINAL CONNECTION
(SEE GENERAL NOTES 6 & 7 FOR REQUIRED HARDWARE)



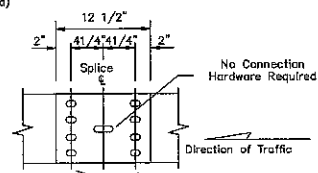
NON-SYMMETRICAL TRANSITION
TO W-BEAM (10 Gauge)



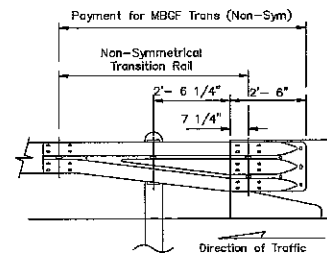
LOW FILL CULVERT POST

Culverts of 25 ft. or less, see CF(31)LS standard for "Long Span" option.

Epoxy Notes:
Epoxy Anchor Option: This option may only be used if the culvert slab is 8" min. thick. Threaded anchor rods must be 7/8" dia. ASTM A449 or A193 Grade B7 with heavy hex nut, and one hardened washer each. Embed anchor rods 6" with HINT HIT RE 500 epoxy adhesive. Other Type III Class C epoxy adhesives meeting the requirements of DMS-6106, "Epoxies and Adhesives", may be used if it can be demonstrated that they meet or exceed the strength requirements of RE 500 with the same embedment depth and threaded rod dia. Follow the manufacturer's requirements for installing applied threaded rods. Extend rods 1/4" min. beyond nut.



MID--SPAN
RAIL SPLICE DETAIL



note: All rail elements shall be lapped in the direction of adjacent traffic.

1. The type of post (round wood post, rectangular wood post, or steel post) will be as shown in the plans. The exact position of MGBF shall be shown in the plans or as directed by the Engineer. Steel posts to be galvanized in accordance with Item 445, "Galvanizing."
2. Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 2 1/2" or 12'-6" (from...) lengths. Rail elements may have slotted holes at 3'-11 1/2" C-C or 5'-3" C-C. A special length of rail may be manufactured to accommodate the downstream anchor terminal (DAT) and the transition sections of guardrail.
3. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and type A (1 3/4" O.D.) washer and not more than 1" beyond the nut. Bolt head "spliced" bolts (ASTM A307) are 5/8" x 1 1/4" (or 2" long at triple rail splices) with a 5/8" double recessed nut (ASTM A563). This beam "connection" 7/8" dia. (ASTM A325) hex bolts shall be of sufficient length to extend through the full thickness of the rail, washers, and nuts.
4. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
5. Crown shall be widened to accommodate the Metal Beam Guard Fence.
6. The lateral approach to the guard fence, shall have a maximum slope of 1V:10H.
7. If shown elsewhere in the plans or as directed by the Engineer, the guard fence may be flared at a rate of 25:1 or flatter.
8. Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be positioned so that the face of curb is located directly below or behind the face of the rail. Rail placed over curbs shall be installed so that the post head is located approximately 25 inches above the gutter pan or edge of shoulder.
9. If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, or drill two 12" dia. front to back overlapping holes, 24" into the rock. If solid rock is encountered below 18", drill a 12" dia. hole, 12" into the rock or to the standard embedment depth, whichever maybe less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
10. Posts shall not be set in concrete, or any depth.
11. Special fabrication will be required at installations having a curvature of less than 150 ft. radius.
12. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL may furnish composite material posts and/or blocks.
13. For posts located partially or wholly between precast box culvert units, the use of a cast-in-place concrete closure between boxes is required. See Detail "A" on Bridge Standard SCP-MD.

GENERAL NOTES

SHEET NO. 31

APPROVED: [Signature]
Development Coordinator

DATE: 7/28/17



Texas Department of Transportation

METAL BEAM GUARD FENCE

GF(31)-14

FILE#	g03114.dgn	DR#	TXDOT	CA#	AM	SP#	VP	CR	CSL
CYDOT#	December 2011	COAT	SECT	JOE	Fiduciary				
REMISSION		EST	COUNTY				SINSET NO.		

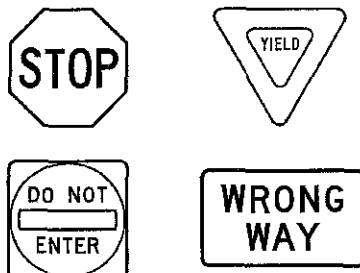
SHEET 1 - (GFD 1)-14

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DATE: FILE:

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLUORESCENT YELLOW	TYPE B _{FL} OR C _{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLUORESCENT YELLOW GREEN	TYPE B _{FL} OR C _{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

- Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign fabrication sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
- Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (A, C, D, E, Enod or F).
- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
- Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
- White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
- Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
- Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
- Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

ALUMINUM SIGN BLANKS THICKNESS

Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

DEPARTMENTAL MATERIAL SPECIFICATIONS

ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

<http://www.txdot.gov/>

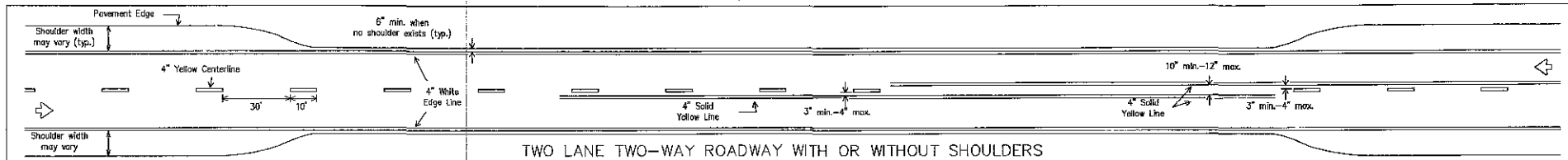
SHEET NO.
34

APPROVED:
DATE: 7/26/17

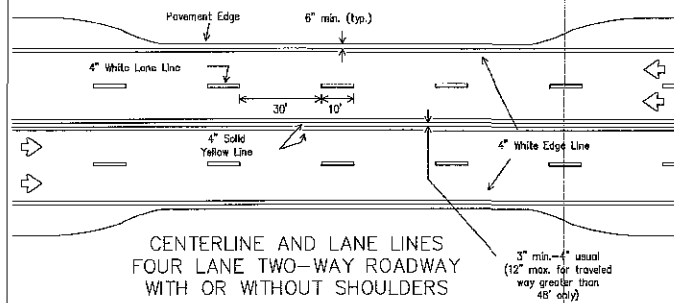
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TYPICAL SIGN REQUIREMENTS			
TSR(4)-13			
FILE: 1004-13.dgn	DATE: 10/01/2003	REV: 10/01/2003	REV: 10/01/2003
12-01 7-13 9-08	REVISIONS	COUNT	SHEET NO.

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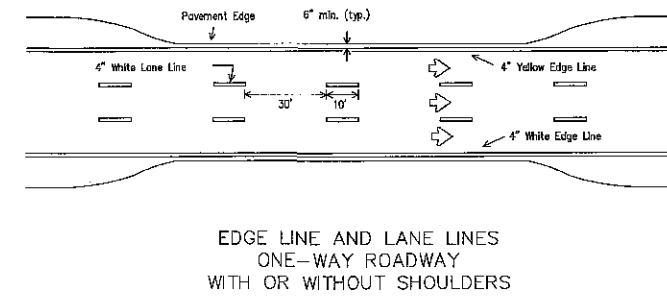
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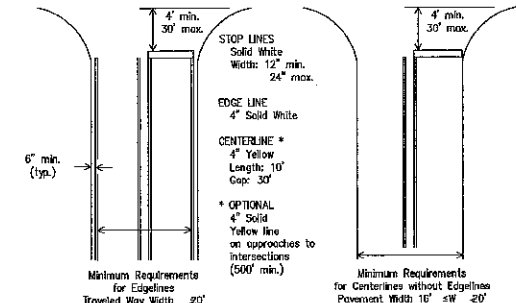
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



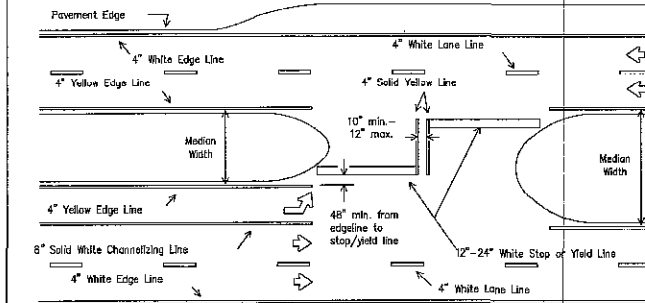
CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS

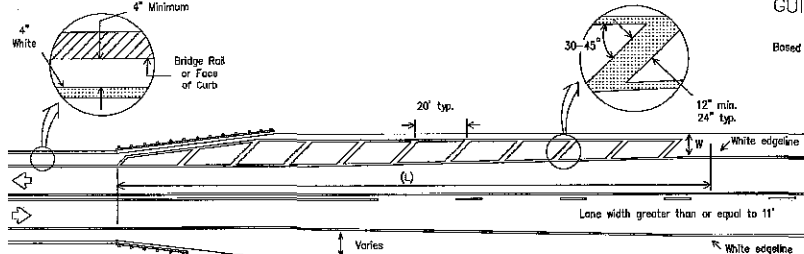


GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE
Based on Traveled Way and Pavement Widths for Undivided Highways



All medians shall be field measured to determine the location of necessary striping. Stop/Yield bars and centerlines shall be placed when the median width is greater than 30 ft. The median width is defined as the area between two roadways of a divided highway measured from edge of traveled way to edge of traveled way. The median excludes turn lanes. The median width might be different between intersections, interchanges and of opposite approaches of the same intersection. The narrow median width will be the controlling width to determine if markings are required.

FOUR LANE DIVIDED ROADWAY INTERSECTIONS



NOTES:

1. No-passing zone on bridge approach is optional but if used, it shall be a minimum 500 feet long.
2. For crosshatching length (L) see Table 1.
3. The width of the offset (W) and the required crosshatching width is the full shoulder width in advance of the bridge.
4. The crosshatching is not required if delineators or barrier reflectors are used along the structure.
5. For guard fence details, refer elsewhere in the plans.

ROADWAYS WITH REDUCED SHOULDER
WIDTHS ACROSS BRIDGE OR CULVERT

TABLE 1 - TYPICAL LENGTH (L)

Posted Speed *	Formula
≤ 40	$L = \frac{WS^2}{60}$
≥ 45	$L = WS$

* 25th Percentile Speed may be used on roads where traffic speeds consistently exceed the posted speed limit. Crosshatching length should be rounded up to nearest 5 foot increment.

L=Length of Crosshatching (FT.) W=Width of Offset (FT.) S=Posted Speed (MPH)

EXAMPLES:

An 8 foot shoulder in advance of a bridge reduces to 4 feet on a 70 MPH roadway. The length of the cross-hatching should be:

$$L = 8 \times 70 = 560 \text{ ft.}$$

A 4 foot shoulder in advance of a bridge reduces to 2 feet on a 40 MPH roadway. The length of the cross-hatching should be:

$$L = 4(40) \div 60 = 106.67 \text{ ft. rounded to 110 ft.}$$

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD
PAVEMENT MARKINGS

PM(1)-12

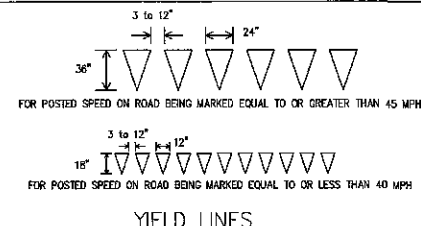
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should typically be placed a minimum of 8 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel and not the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to inside of edgeline of a two lane roadway.

APPROVED:
 DATE: 7/28/12

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



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SHEET 1 - PM(1)-12

DATE: FILE: The use of this standard is governed by the "Texas Engineering Practice Act" and the "Texas Professional Engineers Act" and the "Texas Professional Surveyors Act". No liability is assumed for any error or omission in this standard or for any damage or injury resulting from its use.

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive codes correspond to project estimate and quantity sheets)

SM RD SGN ASSM TY XXXX(X)XX(X)XXX

Post Type

- FRP = Fiberglass Reinforced Plastic Pipe (see SMO(FRP))
- WSP = Wood Splice Pipe (see SMO(WSP))
- SPB = Schedule 80 Pipe (see SMO(SLP-1) to (SLP-3))
- SLP = Steel Pipe (see SMO(SLP-1) to (SLP-3))

Number of Posts (1 or 2)

Anchor Type

- UA = Universal Anchor - bolted down (see SMO(FRP) and (WSP))
- UB = Universal Anchor - bolted down (see SMO(FRP) and (WSP))
- US = Wedge Anchor Steel - (see SMO(WSP))
- SW = Wedge Anchor Steel - (see SMO(WSP))
- SP = Steel Pipe - bolted down (see SMO(SLP-1) to (SLP-3))
- SB = Steel Pipe - bolted down (see SMO(SLP-1) to (SLP-3))

Sign Mounting Description

- P = Parallel - "Plain" (see SMO(SLP-1) to (SLP-3), (WSP), (FRP))
- U = Universal - "Up" (see SMO(SLP-1) to (SLP-3))
- IF REQUIRED - "IF" (see SMO(SLP-1) to (SLP-3))
- TEXT or EXT = Number of Extensions (see SMO(SLP-1) to (SLP-3), (WSP))
- BA = Extruded Aluminum Beam (see SMO(SLP-1) to (SLP-3))
- WE = 1-1/2" x 7/8" Wing Channel (see SMO(SLP-1) to (SLP-3))
- EA = Extruded Aluminum Sign Panels (see SMO(SLP-1) to (SLP-3))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT

Non-breakaway portion of support (i.e., 4" max. height).

To avoid vehicle undercarriage snagging, any breakaway support must be designed so that when it is broken away, should not present more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

SIGN LOCATION

PAVED SHOULDER

BEHIND BARRIER

BEHIND GUARDRAIL

RESTRICTED RIGHT-OF-WAY

T-INTERSECTION

When this sign is needed at the end of a two-lane road, it should be placed at the end of the road, as close to the intersection as practical.

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

Back-to-Back Signs

Boots used to mount sign panels to the clamp are 3/16" x 1/8" galvanized square with 1/4" hole. The bolt length is 1 1/4" for aluminum.

When two sign panels are used to mount signs, the sign panels should be bolted to the sign post with nut and lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table or figure. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.

Pipe Diameter	Specific Clamp	Universal Clamp	Approximate Bolt Length
2" nominal	3"	3" or 3 1/2"	3"
2 1/2" nominal	3 or 3 1/2"	3 1/2" or 4"	3 1/2" or 4"
3" nominal	3 1/2" or 4"	4 1/2"	4 1/2"

BEHIND BARRIER

BEHIND GUARDRAIL

RESTRICTED RIGHT-OF-WAY

T-INTERSECTION

When this sign is needed at the end of a two-lane road, it should be placed at the end of the road, as close to the intersection as practical.

GENERAL NOTES & DETAILS

SIGN MOUNTING DETAILS

SMALL ROADSIDE SIGNS

GENERAL NOTES & DETAILS

SMD (GEN) -08

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Station System components and other related system components.

The website address is: <http://www.tdot.texas.gov/publications/traffic.htm>

APPROVED: *[Signature]*
DATE: 3/2/02

Texas Department of Transportation
Traffic Operations Division

Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other features.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

See Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

BEHIND BARRIER

BEHIND GUARDRAIL

RESTRICTED RIGHT-OF-WAY

T-INTERSECTION

When this sign is needed at the end of a two-lane road, it should be placed at the end of the road, as close to the intersection as practical.

0.25 H

0.2W

0.6W

0.2W

NUT (XX)

POST (XX)

Detail A

The devices shall be installed per manufacturer's recommendations. Installation procedures shall be provided to the Engineer by Contractor.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered at a depth of 18" or more, the foundation shall be a minimum depth of 30". If solid rock is encountered, the socket/stem may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stem shall be from the bottom and the clearance rest/reamers given on S&D/EG must be followed. The anchor base post is to be drilled down and drilled 1/2 hole with concrete drill bit.

2. Level and plumb the base post using a torpedo level and allow concrete solids to cure.

3. Time to set. The bottom of the post is provided in the step pipe shall remain above the top of the concrete foundation.

4. Insert the top of the sign post into the post.

5. Insert sign post into base post.

6. Insert sign post into base post. Lower until the post comes to rest on steel rod.

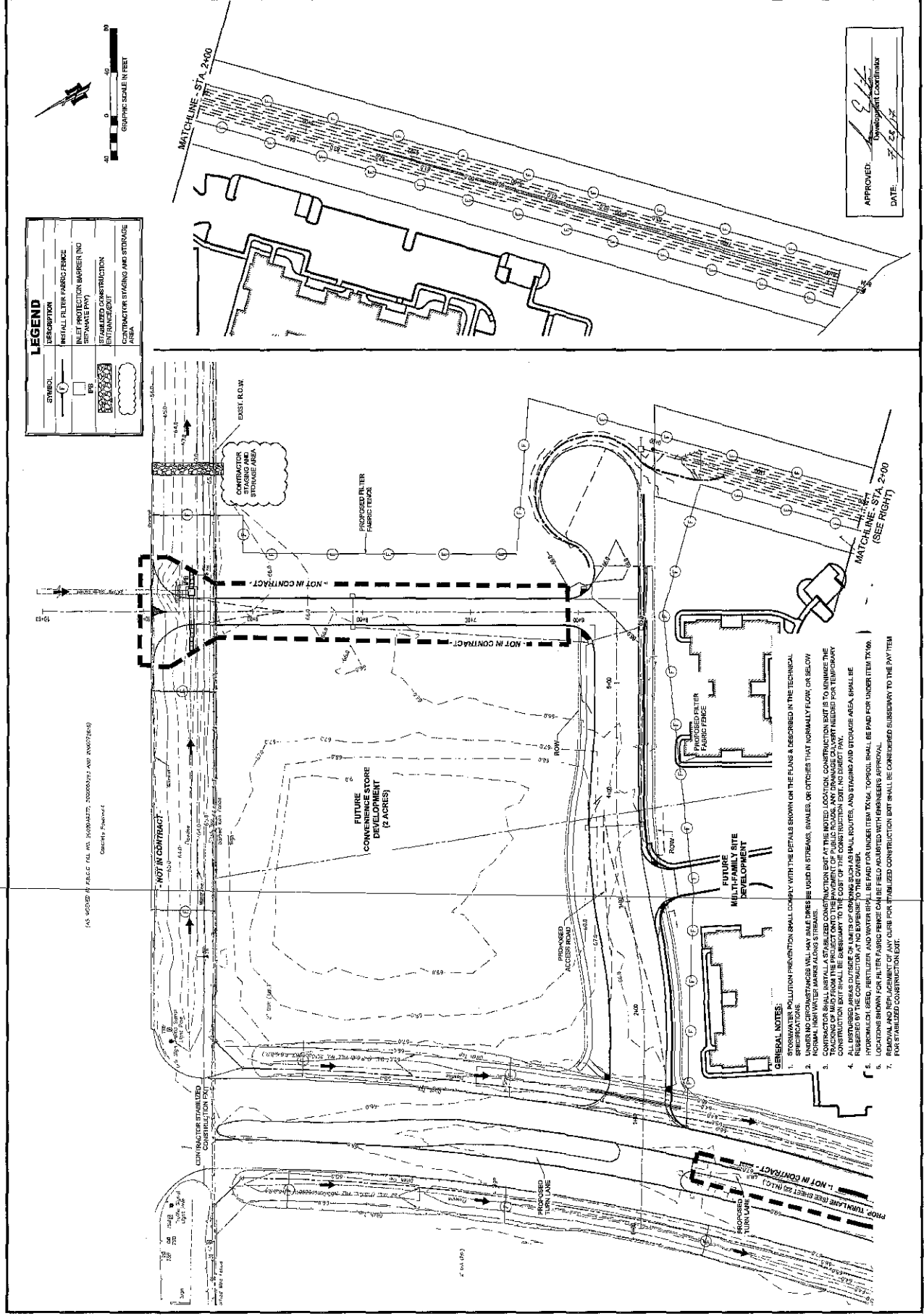
7. Set compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of post when optimally installed.

8. Check sign post by hand to ensure it is unable to turn. If loose, increase the

SMD (TWT) -08

APPROVED: [Signature]
Development Coordinator

DATE: 7/28/17



LEGEND

SYMBOL	DESCRIPTION
(Symbol: Dashed line with cross-hatches)	INITIAL FILTER FABRIC FENCE
(Symbol: Solid line with cross-hatches)	INLET PROTECTION BARRIER (NO SEWAGE PUMP)
(Symbol: Dashed line with cross-hatches)	STABILIZED CONSTRUCTION ENTRANCE/EXIT
(Symbol: Dashed line with cross-hatches)	CONTRACTOR STAGING AND STORAGE AREA

APPROVED: *[Signature]*
 DATE: 10/1/2017

